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College of Business Administration

University of Arkansas
Fayetteville

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Style Notes

Each manuscript should be double-spaced and submitted in triplicate. The length of the article should not exceed 20 pages including tables, appendices and references. Each chart or table should be camera ready, that is, an original on a separate page. References are to be listed on a separate page at the end of the submitted article and are to be numbered sequentially in order of textual citation with a corresponding superscript at the point of reference. The listing will be used as "Endnotes" to the published article and should be in footnote format.

For example, as a minimum, each endnote item will indicate:

For a book: list (as appropriate) author's first name, middle initial, and surname; the title of the book; publication data including place, publisher, and date; and the page number(s) in the citation.

For an article in a periodical: list (as appropriate) the author's first name, middle initial, and surname; title of the article; name of the periodical; volume number or month and year for the issue; and page number(s) in the citation.

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ABER MEMBER

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An Economic Forecast for Arkansas Through 1989

Harry French
Associate Economist
University of Arkansas, Fayetteville

Introduction

In late August, the Bureau of Business and Economic Research, in its annual quest to provide timely economic and business information to Arkansans, mailed out a questionnaire on Arkansans' economic expectations through 1989. The survey was sent to a purposive sample consisting of 235 Arkansans whose jobs require them to be knowledgeable on economic events and trends at the local, regional, and national levels. The sample included academics, business people, and public officials. Seventy-nine usable responses were received for a response rate of 34 percent which, without follow-up, is statistically acceptable. Note that the response rate exceeded that from last year's survey[1] by 10 percentage points and approximates the earlier-than-1987 experience with response rates. The response-rate drop last year and the rebound this year have no patent explanations and, since the underlying causes have not been explored, can not be satisfactorily accounted for at this time.

The cover letter and the questionnaire itself are included as Exhibit 1 and Exhibit 2, respectively. Note that in Exhibit 2, entered beside each subitem of items 1 through 15 and 17 through 21, is the percentage distribution of responses to the item. Note that the percentage total for each item may not equal 100 percent because of rounding. The item 16 breakout shows 3 separate percentages for each year in the order of (1) percentage indicating a "less than 50 percent chance," (2) a "50 percent or better chance," and (3) the percentage of responses actually indicating a "100 percent chance" or a "sure thing."

Discussion

Three items relate directly to general welfare -- numbers 16, 20 and 21. Looking at each item separately, starting with 16, continuing recovery, the consensus that chances were even or better that the recovery would continue through 1988 is essentially total with a 98 percent response; and through 1989 a like consensus remains substantial at 85 percent of the responses. But the breakouts in items 20 and 21 are less robust in hailing "continuing good times." In item 20 financial welfare, even for the current year relative to last year, individual well-being is only rated by 30 percent as feeling better off than a year ago; 55 percent, as about the same; and 14 percent, as less-well off. In item 21, individual well-being for 1989, the breakout is less optimistic with 31 percent expecting to be better off next year; 42 percent, to be about the same as in 1988; and 22 percent, worse off than in 1988. The responses for the three items, taken

together, seem to imply a positive optimism in the national trend while raising a troubled, even uneasy, view of the state's ongoing economy.

Again, despite the generally buoyant attitude reflected the responses to item 16, items 1, wage rates, 2, consumer loans, and 3, capital investment, all indicate a "blah" trend in Arkansas. Item 4, general price level, shows that 73 percent for 1988 and 65 percent for 1989 anticipate inflation between 2 and 5 percent. In item 5a, residential building, 68 percent for 1988 and 74 percent for 1989 believe the total will be the same or less than that reported for 1987. Item 5b, mortgage rates, reflects majority opinions for their being up, 78 percent for 1988 and 59 percent for 1989. Item 6, retail sales, the responses show simple majorities in the "up" category for both 1988 and 1989 but include substantial percentages in the "about the same" choice for 1988 and 1989 at 41 and 38 percent, respectively. In item 10, farm cash receipts, while there was no consensus and notwithstanding the drought, 60 percent, for 1988, and 78 percent, for 1989, feel the total would at least equal the 1987 level. In item 11, general personal income, majorities of 60 percent and 59 percent, for 1988 and 1989, respectively, think that personal income will exceed the 1987 total.

In item 7, unemployment rate, the responses for 1988 indicate that a majority of 76 percent anticipated a 7-8 percent rate while 48 percent chose the 7-8 level for 1989 with an additional 36 percent opting for 8-9 percent. In item 8, civilian labor force, the responses for 1988 are 93 percent for a range between 0 and 3 percent; similarly, 90 percent indicate the same range for 1989. Meanwhile, in item 9, total population, a majority of responses, 59 percent for 1988 and 58 percent for 1989, feel the state's population will follow the 1980-86 trend of growing at a rate less than the U.S. average. In item 12, Dow Jones Industrial Average, responses indicate a majority opinion for 1988 at the 2000 through 2299 level; for 1989, the highest percentage, 35 percent, indicates the same 2000 through 2299 level. The 1989 spread, however, is obviously more diverse with an additional 30 percent opting, for a level of 2300 or more and another 28 percent choosing the less-than-2000 level.

Looking back to the results of the 1987 survey[2] and comparing its predictions for 1988 with those for 1988 from this year's survey, the distributions for comparable items 1 through 4, 5a, and 6 through 10 are remarkably consistent and reflective, at best, of mild optimism. On item 12, this year's expectation was considerably more restrained than the 1987 prediction which was made before the stock market plunge of October 1987.

Returning to the analysis of this year's survey, in item 13, 68 percent chose these important issues, in descending order of importance: budget deficit, interest rates, national debt, trade deficit, and inflation and foreign imports tied for fifth. For 1989, 65 percent chose, in descending order, budget deficit, interest rates, national debt, inflation, and trade deficit. Last year's survey noted that for 1988 the five important issues were the budget deficit, trade deficit, foreign imports, interest rates, and inflation.

In item 14, economic problems, 61 percent for 1988 rated the national debt, trade deficit and interest rates as the three most serious areas but another 13 percent felt manufacturing productivity and real growth as a fourth area for concern. For

1989, 57 percent felt that interest rates, the national debt, and the trade deficit were the three serious economic problems with inflation and manufacturing productivity tied at 14 percent each as a fourth problem area. Last year's survey, found that, for 1988, budget deficits, trade deficits, and inflation were the most serious problems with declining productivity in a near fourth choice.

Item 15, maintaining low unemployment, requires additional analysis. Somewhere between the return of the small, local test-run questionnaire and the mailout to the survey sample, the key word -- unemployment -- lost its "un" and, consequently, together with its given list of choices, raised the confusion factor to a high level. Accordingly the item, though shown here with its response distribution, is declared biased and invalid. For example, a fourth of the survey responders, corrected the error and then answered; but another 14 percent noted the error and elected not to answer. Surprisingly, however, 51 percent, a simple majority, made their choices without any indication of confusion. The remaining 10 percent did not respond nor did they indicate a problem with the item as presented. Thus, of the possible responses, only the first group, 25 percent, could really be accepted as valid; therefore, item 15 must be rejected even though the total response identifies stimulated national employment, upgraded job training, and let the price system regulate just as occurred on last year's survey with a correctly stated item 16.

Items 17, 18, and 19, new banking laws, campaign issues, and reducing unemployment, respectively, show a great deal of variety. For example, in item 17, 31 percent chose fewer but larger banks, and 25 percent thought more competitiveness in the short run services but at higher costs. Item 18 responses indicate that only five sub-items attracted more than a 10 percent option: national defense at 15 percent; taxes, 14 percent; national debt, 12 percent; drug abuse, 11 percent; and budget and trade deficits, 10 percent. Item 19 responses show diversity with 36 percent saying to seek new industry from out of state, 25 percent urging the revamping of state education programs, and 18 percent advising to increase entrepreneurial service centers. Note too that 12 percent of the responses under item 19 suggested other approaches, most of which involved improving vo-tech and public schools and providing better coordination and funding of existing service organizations.

Conclusion

Unease characterizes the overall tenor of the responses with the presidential election injecting some "iffiness" in the views on the trend of U.S. economic welfare. Consequently, while the outlook on the national economy remains positive, if only modestly so, the responses from our sample reflect a more wary and cautious expectation for the Arkansas economy. Perhaps the continuing spate of pessimism over the economic situation being reported in various media releases will in fact turn into a self-fulfilling prophecy of slow-down or recession. Nevertheless, this survey sample, while subdued, is yet to be convinced that "it's starting to look all bad" for the near future.

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[1] Harry French, "An Economic Forecast for Arkansas Through 1988," *Arkansas Business and Economic Review*, Volume 24, Number 2, 1987, p. 1.

[2] _____ pp. 1-2.

Exhibit 1

BUREAU OF BUSINESS AND ECONOMIC RESEARCH
(501) 575-4151
Fayetteville, Arkansas 72701

UNIVERSITY OF ARKANSAS · College of Business Administration

August 29, 1988

Dear Sir/Madam:

Your help is requested in making a consensus forecast of the trend of Arkansas economic activity through 1989. Specifically, you are asked to indicate under each item of the attached questionnaire the choice(s) that most closely reflects your view of the Arkansas economy.

Such a forecast would be a natural and desirable extension to supplement the research published in the Arkansas Business and Economic Review, which is distributed to more than 2500 Arkansas subscribers. Accordingly, the Bureau staff has developed a questionnaire to be sent to some two hundred Arkansas residents who are knowledgeable of the state economy and can provide expert opinions on the economic trend. The survey sample consists of selected representatives from academia, business, and government. Predictions are sought for the yearend positions of calendar years 1988 and 1989.

In addition to your responses to the specific items, please feel free to add suggestions on other subject areas that should be included in future economic forecast surveys. Note that you are not asked to identify yourself with your responses; but if for some reason you wish to identify yourself in responding, your submission will be accorded confidentially. Upon completion, please return the questionnaire to:

Bureau of Business and Economic Research
College of Business Administration
University of Arkansas
Fayetteville, Arkansas 72701

You are asked to return your completed questionnaire as soon as possible but not later than September 20, 1988, so that the resulting forecast can be included in the issue of the Review to be published this fall. Your participation will be appreciated. An addressed, postage-paid envelope is enclosed for your convenience.

Sincerely,

Phillip Taylor
Director

PT/lll

Enclosure

The University of Arkansas is an equal opportunity/affirmative action institution

Exhibit 2

ECONOMIC CONDITION SURVEY

Part I: Estimated Key Economic Trends as of calendar yearends 1988 and 1989

Please indicate the word or phrase under each item which most nearly corresponds with your view. As a point of reference, unless specified otherwise, all change is to be estimated for the 1988 and 1989 yearend levels. (Base = yearend 1987)

1. Wage rates in real terms (taking inflation into consideration) in Arkansas will be:

1988		1989	1988		1989
12%	Down	17%	51%	About the Same	41%
37%	Up	42%	0%	No Opinion	0%

2. Total consumer loans in Arkansas for personal consumption expenditures will be:

1988		1989	1988		1989
18%	Down	18%	18%	About the Same	36%
61%	Up	43%	3%	No Opinion	2%

3. Availability of capital investment funds for expenditure in Arkansas on plant and equipment will be:

1988		1989	1988		1989
25%	Down	30%	41%	About the Same	34%
32%	Up	34%	1%	No Opinion	1%

4. General price level for consumers (inflation) in Arkansas will be:

1988		1989	1988		1989
0%	Down more than 2%	0%	28%	Up 2% to 3%	21%
0%	Down 1% to 2%	1%	45%	Up 3% to 5%	44%
9%	About the Same	8%	1%	Up more than 5%	16%
16%	Up 1% to 2%	10%	0%	No Opinion	0%

5a. Value in current dollars of new residential building in Arkansas ($648.8 million in 1987) will be:

1988		1989	1988		1989
47%	Below 1987 level	47%	21%	About the Same	27%
25%	Above 1987 level	19%	7%	No Opinion	6%

b. Mortgage rates in Arkansas for home buying or home equity loans will be:

1988		1989
7%	Down	18%
12%	About the Same	18%
78%	Up	59%
4%	No Opinion	4%

6. Level of Commercial-Industrial activity in Arkansas as measured by retail sales will be:

1988		1989	1988		1989
5%	Down	12%	41%	About the Same	38%
54%	Up	50%	0%	No Opinion	0%

7. Unemployment rate in Arkansas (7.8% in June 1988) will be:

1988		1989	1988		1989
4%	Under 5%	1%	12%	Between 8% & 9%	36%
5%	Between 6% & 7%	13%	1%	Over 9%	5%
76%	Between 7% & 8%	43%	1%	No Opinion	1%

8. Civilian labor force (1,100,600 in December 1987 and 1,128,200 in June 1988) in Arkansas will be:

1988		1989	1988		1989
44%	Up 1% or less	41%	0%	Up 5% to 7%	0%
49%	Up 1% to 3%	49%	0%	Up 7% or more	0%
1%	Up 4% to 5%	4%	6%	No Opinion	6%

9. In comparison with the U.S. average Arkansas' total population change (Arkansas' estimated change for 1980 to 1986 only 60% of the U.S. average) will be:

1988		1989
59%	Below the U.S. average	58%
22%	About the same as the rest of the country	18%
12%	Above the U.S. average	17%
8%	No Opinion	8%

10. Total farm cash receipts in Arkansas for 1987 and 1988 in current dollars ($2,888 million in 1986 and estimated $2,923 million in 1987) will be:

1988		1989
26%	Below 1987 current dollar level	6%
19%	About the same as 1987 current dollar amount	29%
41%	Above 1987 current dollar level	49%
14%	No Opinion	15%

11. In comparison with the estimated 1987 annual total of $27,090 million, total annual Personal Income for Arkansans in current dollars will be:

1988		1989	1988		1989
8%	Down	10%	32%	About the same	31%
60%	Up	59%	0%	No Opinion	0%

12. The Dow Jones Industrial Average (2026.7 at close August 24, 1988) will be:

1988		1989	1988		1989
0%	Under 1700	3%	1%	Between 2400 & 2499	4%
4%	Between 1700 & 1899	14%	0%	Between 2500 & 2599	3%
17%	Between 1800 & 1999	11%	0%	Between 2600 & 2799	0%
69%	Between 2000 & 2299	35%	0%	Over 2800	1%
3%	Between 2300 & 2399	22%	5%	No Opinion	7%

13. Check the five (5) issues that you feel will exert the most influence on the U.S. economy during the indicated year:

1988		1989
9%	Inflation	11%
13%	National Debt	12%
16%	Federal Budget Deficit	17%
9%	Weather effects on agriculture and energy usage	2%
1%	Ecological imbalance and environmental pollution	2%
9%	Foreign imports and investments in domestic markets	9%
3%	Foreign restrictions to open-market trading	3%
3%	Unemployment	4%
3%	Energy supply and cost	3%
11%	Balance of trade deficit	10%
14%	Interest rates	15%
2%	New federal laws, regulations or court decisions	3%
3%	Money supply	4%
3%	International economic and defense commitments	3%
0%	Other	1%

14. In the United States society, the three (3) most serious economic problems will be:

1988		1989
7%	Imports and Foreign investment in domestic market	5%
4%	Unemployment	6%
9%	Inflation	14%
13%	Manufacturing productivity and real growth	14%
21%	Balance of trade deficits	17%
23%	National Debt	19%
17%	Interest rates	21%
3%	International exchange rates	3%
3%	Other	1%
	"	
	"	

15. With the recent U.S. experience as regards inflation and unemployment, indicate those national approaches that you believe would maintain low employment:

1988		1989
2%	Reinstitute the military draft	3%
5%	Create more "public service" jobs	5%
9%	Increase public works spending	8%
21%	Tax credits to stimulate national employment	21%
19%	Tax credits to stimulate upgraded job training	20%
20%	Let the price system regulate the domestic market	22%
0%	Broaden entitlement programs	2%
9%	Impose selective trade and tariff barriers on imports	10%
2%	Increase defense spending	2%
5%	Farm aid for drought relief	2%
6%	Other	6%
	"	
	"	

16. What in your judgment is the percent chance (100% = certain) that the recovery in the domestic economy will continue through 1988? 1-98-25%, through 1989? 15-85-3%

Part II: Other Current Items

17. Impact of new banking laws in Arkansas will be (check all appropriate choices):

31% fewer but larger Arkansas banks
10% more geographical dispersion into smaller communities
25% high short-run service competitiveness among area banks
22% expanded service with increased operating costs
5% less drain of wealth from state
6% Other: _____

18. Major campaign issues of the 1988 presidential election will be (check all appropriate choices):

15% National Defense
14% Taxes
3% Discount and Prime Interest Rates
12% National debt
10% Trade and Budget Deficits
6% Unemployment
5% Federal Government regulation
9% Education
11% Drug Abuse
3% Ethics
4% Childcare
7% Environmental Pollution
2% Other: _____

19. The best ways to create jobs and reduce unemployment in Arkansas are to (check all appropriate choices):

18% create more entrepreneurial service center operations
36% actively seek new industry from out of state
25% emphasize Science & Technology in state education programs
9% provide statewide assistance to all eligible college students
12% Other: _____

20. Most Arkansans that you know or work with believe that today they are financially (choose one):

30% better off than a year ago
55% about the same as a year ago
14% worse off than a year ago
1% no opinion

21. Most Arkansans that you know or work with believe that a year from now they will be financially (choose one):

31% better off than today
42% about the same as today
22% worse off than today
6% no opinion

Organizational Communication: A Disaster for Challenger

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Introduction

On January 28, 1986, the explosion of the space shuttle Challenger shocked the entire world. People from all walks of life were affected in one way of another by this disastrous event. In the aftermath of this widely covered event, people began to ask, "Why did this tragedy occur?".

After a rigorous investigation, the Rogers Commission[1] concluded that the launch should never have been approved by management in the first place. Further evidence revealed that engineers of NASA and Morton Thiokol (the company that designed the solid rocket booster for the shuttle) had warned management of ice on the launch pad constituting a potential hazard to the shuttle during lift-off and that the temperature was too low to ensure safety of the launch. The people responsible for management of the launch ignored those warnings and approved the fatal launch which was viewed on national television by countless numbers of people.[2]

This tragedy raises many questions concerning the roles of both the top management and the engineering/technical people in the decision making process. What were the underlying problems in this catastrophe? How can disasters like this be prevented? Who should have absolute authority in making decisions when there is clearly a "knowledge gap" between management and technicians/engineers? How can technicians effectively relay necessary or vital information to managers in a manner which communicates necessary and relevant information to support effective decision making? The answer to all three questions lies basically in one word--communication. In order for top management to understand what information is being relayed to them by their engineers, there must be an effective means of communication between the two groups. This paper will explore the theoretical implications of this communication process as well as examine the problems that led up to the shuttle disaster. Some suggestions will be proposed concerning communication problems between technical personnel and managers in the decision making process. Finally, the

authors suggest some implications concerning information systems support for communication processes.

The Evolution of Challenger: Creating the Gap

Budget Impact

The decision to develop a new space transportation system was made by President Nixon on January 5, 1972. It was then that a communication gap between "number crunching" managers/budget personnel and engineers/technicians began. NASA to meet budget constraints, was forced to make several design changes to continue with the developmental phase of this project. Tradeoffs between budget constraints and design considerations began early in the developmental stages of the project and became the norm as program costs began to soar. "The implications of these trade-offs for program success were not sufficiently examined before the decision to proceed (with design) was made, despite warnings from White House budget and technical advisors."[3] The decision to proceed was based on marginally sufficient data and lacked the proper commitment from executive politicians and budget personnel. For example, budget constraints during the development of the shuttle caused certain design features to be eliminated or overlooked, Further cuts were instituted during the construction of the shuttle to satisfy managers of NASA and the various contractors involved. Logsdon states that the shuttle decision stands as a powerful example of how not make a national commitment to an undertaking on which many other significant projects depend.[4]

There were at least six configurations of the space shuttle proposed before the final design was selected. The final design included two disposable solid rocket boosters to help lift the massive spacecraft off the earth. At the time of the proposal, the expendable boosters were not technically feasible, but through pressure to save money and trim the budget, engineers cut corners and developed the expendable booster by using two solid rocket boosters. One major modification involved moving these huge hydrogen tanks outside the airframe of the shuttle, while combining them with the oxygen tanks in one structure.

Tradeoffs between development and operating costs characterized the rest of the design process, but with much more attention being paid to lowering investment costs than to the downstream consequences for those who would use the system.[5] It is clear that the design process was "refined" in order to meet budget requirements; safety was sacrificed in the long run with little regard for the human cargo who, most likely, would be unaware of the imposed constraints of budgets and safety. The safety problems were not communicated to anyone at all. Perhaps they ware either stifled by managers in charge of the budget, or the engineers played the "budget game" and reduced their criticisms of technical problems.

Time Impact

While unrealistic budget constraints may have had a deleterious impact on the design of the shuttle, imposed time constraints also had a significant impact on the program. Unrealistic schedules established by managers without the advise or consent of the technicians created poten-

tial hazards. The space shuttle Challenger is a classic example of poor communication between management and technicians concerning the scheduling of events to successfully complete a project. There was immense pressure on all concerned to reach a goal of 24 shuttle missions a year. "The pressure on NASA to achieve planned flight rates was so pervasive that it undoubtedly adversely affected attitudes regarding safety."[6] Management was setting goals that appeared to be reasonable to the general public while looking as though great progress was being made in the program. What management ignored were the technical implications of these decisions. While the 24-mission per year goal looked reasonable yet progressive to the public, NASA apparently lacked the technology to achieve this. Management placed the priority of reaching this goal over technical feasibility and safety considerations.[7] The schedule became so important to top level management, that pressure and demands to meet time constraints trickled down to project engineers and technicians. This pressure led employees at lower levels to overlook certain pre-flight standards which ensured the highest level of safety.

In summary, the pressures of meeting budget limitations and unrealistic schedules created a climate for imminent disaster for the overall project. Prior shuttle missions had all gone reasonable well, so a certain amount of complacency had begun to permeate the project. The schedule seemed reasonable and those who were concerned about safety were seen as a bit radical. Perhaps "group think" became pervasive. Over time, there was a sense that serious problems could not occur during the missions. This attitude was suddenly and absolutely changed on January 28, 1986.

Communication: the Missing Link

Two of the Rogers Commission's recommendations specifically addressed communication problems, One problem was the lack of communication between management and the technicians who are "on the firing line" and who are painfully aware of the operational problems as a project progresses. While proper channels of communication are available to relay information up and down the organization, this does not guarantee that communication occurs. For example, an engineer may inform an upper level manager of safety problems, but the problem may become lost in the maze of technical jargon which the manager may not understand. If the problem is defined in terms of sophisticated equations with technical explanations, the manager is likely to become confused and ignore the problem altogether, perhaps not wanting to admit a lack of knowledge in the specific area. Moreover, documentation by engineers may be worded as to lead managers to a false sense of confidence that the problems have been solved or do not exist. In the case of the space shuttle, documentation of the infamous 0-ring, which was a key factor in the Challenger explosion, was listed as "closed" in the safety review reports. This led managers to think that the problem with this component was solved when in fact it meant that further testing for safety was required.[8] This misunderstanding between management and the engineers contributed to the narrow margin of safety

present on the launch pad. It is clear that there was no standardization of documented data which would produce clear communication between the decision makers and the technical personnel. This lack of communication caused management to miscalculate the significance of the 0-ring problem--and, most important, it served as a signal of the difficulties that arise in communication when opposition and conflicts of diverse interests are present.

A second problem was caused by management isolation. This isolation was intensified by the fact that the project managers often felt more responsibility toward center directors at the Johnson, Kennedy and Marshall Space Flight Centers than they did to the program manager. In the Commission's opinion, the isolation was especially serious at the Marshall center, resulting in the program manager and other key managers not receiving crucial information regarding the poor performance of the joint design. For instance, the Marshall center "had information that the joint design was performing poorly, but this was never brought to the program manager's direct attention".[9]

Listening

Setting all other problems aside, even if management clearly understands the warning relayed to them by engineers and if the risks outweigh the possible gains from continuing the project, these warnings mean nothing if they are ignored by the decision makers. Testimony in the investigation of Challenger's explosion revealed that Morton Thiokol engineers, designers of the shuttle, warned NASA officials that the launch pad was too cold to go ahead with the mission. These low temperatures, the engineers stated, would cause a contraction in the 0-ring, allowing leakage of exhaust gas, possible fueling an explosion. The decision not to launch would, of course, delay the mission for a few days. The recommendation, to which a number of Morton Thiokol engineers agreed, was overruled by a management team that consisted of several vice presidents at NASA, including the engineering vice president, who was told to "take off his engineering hat and put on his management hat."[10] This "group think" decision was a fatal blow to Challenger and its crew. The engineers knew of the impending danger, but their warnings were ignored by the decision makers. They weren't listening.

Overconfidence

For fourteen years before Challenger exploded, a wicked catalyst was being created that joined in the reaction of oxygen, hydrogen and solid fuel. This catalyst was the overconfidence of management that led to a nothing-can-go-wrong attitude.

Fortune magazine tells of Senator John Glenn's assessment of what happened to management at NASA. "The can-do spirit," he noted, "worked perfectly well in the old days when it included a powerful commitment to safety."[11] The "can do" attitude gave way to an arrogant can't fail attitude which blinded management to the risks involved in launching a mission, If a deaf ear is turned toward potential danger, good communications between management and its domain is useless and a total waste of time and money. This is not to say that risks should never be taken, but decision makers must be "smart enough to listen when the people who know what is happening reach the limits of the can-do

spirit."[12] The ear of management is deafened by the complacency brought on by an adequate historical track record. The managers feel that the warnings made by the technical personnel are over cautious and place their own unrealistic expectations and goals above what can realistically be achieved.

Assessment: Learning from the Past

As previously stated, there were several factors that led up to the Challenger explosion. Hindsight, which is always 20-20, reveals some obvious facts concerning the management of the Challenger program. The critical question is whether we can learn from past mistakes and prevent reoccurrence of the impact of budget, time and lack of communications on the successful accomplishment of future missions.

Budget

The budget constraint could have been solved by, of course, an unlimited budget. An unlimited budget would not necessarily eliminate potential disasters. It would be an unreasonable expectation of budgeting for many technical problems can be expected when launching huge spacecraft with millions of functioning parts and very volatile fuels. However, better coordination between technical personnel and managers concerning cost measures and their concomitant effect on progress during the pre-development stages of the shuttle might have made both parties aware of cost and technical constraints. When technical constraints were exceeded, then further assessments would have to be made concerning the status of the project. If compromise were needed on the technical side--safety limits for example--then managers needed to be aware of those consequences. When cost constraints are exceeded, then managers need to evaluate the future value of the project and determine if the budget needs to be increased to continue the project or take any other decision deemed necessary.

Time

Again, when considering an appropriate time schedule for the launching of the shuttle, management and technical personnel ought to collaborate on the timing and number of scheduled launchings. Like the budget, input from both parties should have been considered in the final schedule. This final schedule could have been the result of a balanced cost/time/technology constraint.

Ifs and Should Haves

So far, all the theories behind solving NASA's problems are *ifs* and *should haves*. It is always much easier to criticize decisions made on Friday, on the following Monday. But, it is also easier to see the problems in retrospect and perhaps take steps to prevent recurrence. The Challenger disaster can provide much information on what not to do as well as what to do, not only for NASA, but for other agencies and the business community as well.

Communication Understanding

The purpose of technical reports is to provide information that will help the reader make a decision. Hence, the singular purpose of all technical writing is to provide facts, or opinions based on facts. The need for definition always arises when complex technical terms are introduced. Far too often an assumption is made that the members of the audience the writer is

addressing will be familiar with technical terms when, in fact, these terms do not appear in dictionaries for general use.

Furthermore, technical personnel should never forget that the fundamental purpose of technical writing is to explain something--usually something that is intensely complex--and that messages should be adapted to the needs of a stipulated audience, Technical people are extremely proud of the complex knowledge and skills they possess--and rightly so--but they must use this knowledge to translate complex ideas logically to management.

To sum up, if managers and technical personnel do not have a common language or jargon within which to work, then crucial misunderstanding can occur. At the minimum, there needs to be some standardization of technical language so that managers understand the risks associated with each step of a decision process. The consequences of not doing so can be enormous.

Listening

It has often been said that one of the greatest faults of American industry is the lack of willingness to listen. In programs involving design or product improvement there has to be participation. Managers and technicians have to be able to sit and listen. This means establishing a two-way communications system where information is actually drawn from the people involved. And when this is the case, management must be prepared to be displeased by what is said for it is the nature of two-way communication that what each side says is not necessarily palatable to the other. A manager who has a reputation for "killing the messenger" will not get the kind of feedback needed for wise decision making.

Moreover, one of the functions of technical personnel should be to follow up. That is, technical personnel should follow a written report with a face to face meeting with the decision makers to make certain that critical incidents are understood. This is especially important when technicians and management are two different entities.

The Communication Gap

In organizations that use technical personnel to design projects, there is a potential communication "gap" between the technicians and the managers who have the responsibility of monitoring and making decisions about the project. Closing this potential gap involves proper, clear communication of adequate and useful information for the decision maker. Information systems are available today which provide a wide assortment of information concerning budgets, profits, return on investment, and project management tools to support the decision making process. These systems are limited in that they don't provide information which explains the risks associated with decisions. This type technical information could further reduce the risk involved in a particular project. Efforts in this area might help reduce the communication gap between the technician and the manager.

MIS Relationship

The management information systems used to support the decision maker involves humans as information processors as well as the computerized data bases. Data bases provide a source of data which is easily accessed and processed to give the manager information on pertinent physical and financial aspects of the project. In order to assess safety risks, the manager must know what he knows and what he

doesn't know and then know whom to consult for assistance. An overall systems view should incorporate all aspects of the project and recognition of its complexity which means providing for possible misunderstanding, exclusion and/or omission of critical information. Implementing these kinds of systems would involve several steps to which we now turn.

Implementation of a Project System

First, the managers responsible for making decisions concerning technical matters should be trained in the rudimentary skills associated with the field. This training would involve basic terminology, design techniques used by engineers and any other relevant technical subjects. This would enable upper level managers to better understand the information communicated to them by engineers and technical personnel. The result would be better insight which would lead to better management decisions regarding technical, financial or safety considerations.

Second, all key personnel in the organization should be trained in technical and managerial topics. These key personnel could serve as interpreters or "links" for both upward and downward communication within the system. The liaisons would ensure effective communication between the technical personnel and management. Using these people would make sure that all pertinent information is relayed to the managers and that decisions would consider technical feasibility as well as physical limitations. In this manner, safe, sensible decisions could be made and carried out with the knowledge of everyone concerned.

Third, an important part of implementing this system would be to design and implement an on-line real time computerized technical data base along with the necessary software to manipulate the data. This data base would include updated, physical data on current projects. Management could then access any project to ascertain its status, or could simulate changes such as a budget cut or delay to see the overall effect on the project. The manager could rely on liaison personnel or the training received in seminars to ensure proper manipulation of the data base.

Conclusion

This paper takes the position that better communication is a necessary ingredient for the successful completion of technical or engineering projects, and that management information systems can play a decisive role in the dissemination of needed information. It is obvious from the Challenger disaster that ineffective upward communication from technical/engineering personnel to upper level managers can lead to bad decisions. If decision makers do not understand the information provided by technical personnel, then a communication "gap" occurs which may be detrimental to the project. Managers need to carefully analyze available information on a day to day basis and avoid a complacent "can't fail" attitude.

Moreover, it is important that managers have some knowledge of the technical fields which they manage. In like manner, technicians and engineers should keep in mind that most of what they do will eventually have to be presented--either orally or in some written form--to decision makers who do not have a comprehensive technical background. Although closing

the communication gap between lower level technical personnel and top level managers will require changes in attitudes and behaviors, these changes should involve competencies that both groups have or could develop within a short period of time.

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[3]J.M. Logsdon, "The Space Shuttle Program: a Policy Failure, *Science*, May 30, 1986, p. 1099.

[4]Logsdon, page 1099.

[5]Logsdon, Page 1101.

[6](anonymous), page 52.

[7](anonymous), page 52.

[8]C. Covault, "O-ring Documentation Misled Managers," *Aviation Week and Space Technology*, March 24, 1986, p. 26.

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Changes in R&D Expenditure and Productivity Growth: A Causal Analysis

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Introduction

In recent years, studies of a possible relationship between the changes in productivity growth and the investment in R&D have been of interest to many researchers mainly due to the productivity decline in early 70s. Table 1 shows a statistical summary of the growth rates of different measures of productivity in the United States since 1948. Productivity, measured by National Income per person employed in the United States economy, which had grown at an average annual rate of 2.16 percent during 1948-73, fell to an average annual rate of 0.06 percent during 1973-82. The average growth rate of National Income per person employed in the non-residential business sector decreased from 2.45 percent per year during 1948-73 to -0.26 percent during 1973-82. Other measures of productivity also show a similar decline in the seventies. Scherer and Denison have shown that growth in the

Table 1
1948-73 Growth Rates Compared with Later Periods, Selected Series

	1948-73	1973-79	1979-82	1973-82
Whole Economy				
National Income	3.70	2.61	-0.54	1.55
National Income/Person Employed	2.16	0.36	-0.54	0.06
National Income/Hour of Work	2.70	0.98	0.28	0.75
Non-residential Business				
National Income	3.58	2.50	-1.18	1.26
National Income/Person Employed	2.45	0.08	-0.93	-0.26
National Income/Hour of Work	2.96	0.77	0	0.51

Source: E.F. Denison: *Trends in American Economic Growth*, 1929-1982, Table 1.1.

labor productivity in the private sector declined from 3.1 percent during 1947-68 to almost zero during 1977-81.[1]

Investment in R&D has been generally acknowledged as a major source of productivity growth. During the early 70s, company-financed R&D stopped growing. It later resumed but at a much slower rate. Denison, in his work on the sources of economic growth, estimated that advances in knowledge accounted for nearly two-thirds of the growth in productivity.[2] Both the growth rate of R&D as well as the R&D-GNP ratio showed a decline during the early 70s. In 1970, R&D expenditure accounted for 1.83 percent of GNP while in 1977, it had fallen to 1.61 percent. Subsequently, R&D climbed to 1.88 percent of GNP in 1983.

However, findings from studies in this area are not conclusive. Scherer, Griliches, Bosworth, and Denison argued that most of the decline in productivity since 1973 cannot be explained by declines in R&D expenditure.[3] Research by others such as Brinner, Kendrick, and Mansfield suggest that declines in R&D expenditure may be quite important in explaining the productivity decline.[4]

Despite the amount of work in this field, there has been no attempt to test directly the presence of causal relationship, if any, between changes in R&D expenditure and productivity growth. This paper aims to fill that gap in the literature. The approach followed in this paper is significantly different from that of previous studies. The focus here is upon three different measures of productivity in the nonresidential business sector, and their possible relationship with R&D expenditure.[5] A test proposed by Granger is employed to test the hypotheses of this study.[6] However, instead of assuming the same lag length for all variables, a statistical technique described in McMillin is used to determine the appropriate lag length for each variable.[7]

The Theoretical Issues section provides a theoretical discussion of the relationship between R&D and productivity and reviews the existing literature. The Estimation Technique section explains the estimation technique and presents and analyzes empirical results. The final section contains a summary and conclusions.

Theoretical Issues

In recent years an important debate has centered on the contribution of investment in R&D to productivity. Several studies have looked at various aspects of the debate. However, no consensus has emerged. There exist disagreements and uncertainty about (1) the nature (direct or indirect) of effects, (2) the magnitude of influence, and (3) the effects of alternative funding methods (private or government).[8]

Griliches found a consistent positive relationship between various measures of company productivity and the investment in R&D.[9] Explaining the phenomenon in the 70s, he suggests that the slow down in productivity growth may be partially linked to the decrease in the productivity of R&D in the manufacturing sector. Indirect effects of R&D have also been suggested by Scherer. He stated, "R&D yields technological advances that in turn foster productivity growth, but the magnitudes involved have been poorly understood".[10]

Kendrick's analysis of the production function includes intangible capital stock as an explanatory variable.[11] He argues

that the intangible capital stock accumulates through investment in R&D, which may be viewed as the major element behind the productive efficiency in the economy. On the other hand, Mansfield et al. have suggested that it is uncertain whether the slowdown in productivity in the 70s is at all due to a slackening of technological advance.[12]

Controversy also exists with respect to the impact of government financed and privately financed R&D on productivity. Griliches argues that company-financed R&D has no superiority over the federally-financed R&D. Terleckyj concluded in favor of indirect effects of privately financed R&D on productivity growth. He also observed that government financed R&D might have had some indirect effects but he did not observe any significant direct effect of private or government financed R&D on productivity growth. However, Link suggested that federally financed R&D increases the efficiency of privately financed R&D.[13]

It can be seen from the above discussion, that scholars agree that R&D expenditures influence productive efficiency, though the nature and the magnitude of that relationship has not been clearly understood. Moreover, the possibility of a reverse causality from productivity decline to decline in R&D investment has not been empirically investigated in the literature. Although Mansfield et al. have pointed out that a diminishing return on R&D investment may be responsible for reduced investment in R&D.[14]

Estimation Technique

Identification of causal relationships among variables has been a major objective of economic research in recent years. Granger's definition of causality between two variables in a time series context has stimulated great interest among researchers. Causality in Granger's sense implies that a variable X causes another variable Y if the past values of X can be used to predict Y more accurately than simply using the past values of Y.

Granger' s method is employed in this study for investigating the causal relationship between R&D expenditure and productivity.[15] Akaike's final prediction error (FPE) criterion is used to specify the lag length of these two variables. An exhaustive study by Thornton and Batten advocates using this criterion for choosing the lag lengths. They argue that the FPE criterion 'performs well' compared to other criteria.[16]

Hypotheses Tests and Empirical Results

There are three plausible hypotheses that will be tested in this paper. First, the hypothesis derived from the studies by Brinner, Kendrick, and Mansfield suggesting that the productivity declines in the 70s were due to the decline in R&D spending. Second, the alternative hypothesis of Scherer, Griliches, Bosworth, and Denison that argues that most of the decline in productivity in recent years cannot be explained by the declines in R&D spending. Third, the possibility of a reverse causation from productivity to R&D spending will also be tested.

The Granger causality tests are performed using annual time series data for the sample period 1956-83. Three different measures of productivity are used - National Income, National Income per person employed, and National Income per hour of work in the non-residential busi-

ness sector. R&D expenditure is measured by the total expenditure in R&D by industries in the non-residential business sector.[17] The test presumes the use of stationary data and, typically, some transformation of the data is made in order to attain stationarity. A first difference of log transformation is required to transform each of the original data series into a stationary series. The adequacy of these transformations are tested by regressing the transformed series on a constant and time. These regressions yield insignificant coefficients on time while similar regressions of the untransformed series show the presence of a trend.

To test the hypothesis that changes in R&D expenditure cause changes in productivity, the following equation is specified

$$P_t = a_0 + b_i(L)P_{t-i} + c_i(L)R_{t-i} + U_t$$

where P represents the growth rate of various measures of productivity, R represents the growth rate of R&D expenditure, U is a white-noise error term and L is the lag operator, such that, $L^kX_t = X_{t-k}$. To examine Granger causality from R to P, the null hypothesis that all the coefficients of the lagged values of R are jointly insignificant ($c_i = 0, i = 1...n$) is tested. Rejection of the null hypothesis implies that R causes P. On the other hand, failure to reject the null hypothesis indicates the absence of a causal relationship from R to P. F-tests are used to test for the presence of Granger causal relations.[18]

The test results are presented in Table 2. Column 1 shows the three different productivity measures employed. Columns 2 and 3 give the optimal values of b, the number of lags of three different productivity measures (P), and c, the number of lags of R&D spending (R), respectively. The optimal values of b and C are calculated using the minimum final prediction error (FPE) criterion. The F-statistics reported in column 5 are calculated under the null hypothesis that the coefficients of the lagged values of R&D are zero (all $c_i = 0$). Following the F- statistics, a sign in parentheses indicates the sign of the sum of the coefficients of the causal variable. Finally, column 6 shows the relevant degrees of freedom of the F-test.

In Table 2, the values of all the F-statistics indicate rejection of the null hypothesis (all $c_i = 0$) at the 5 percent significance level. Results on all three productivity measures suggest that growth

Table 2
Granger Causality Tests*

Productivity Measure	b	c	R^2	F-Statistics	D.F.
National Income	2	3	.40	8.62(+)	3,22
National Income/Person Employed	2	3	.38	7.14(+)	3,22
National Income/Hour of Work	2	1	.46	8.15(+)	1,24

* b = the number of lags of the productivity measures
c = the number of lags of R&D expenditure
The positive sign in parentheses indicates the sign of the sum coefficients of R&D expenditure.

in R&D expenditure causes growth in productivity in the Granger sense. Moreover, the sum of the effects of R&D growth on each individual measure of productivity growth is significantly positive at the 5 percent level. This implies that productivity growth and R&D expenditure growth move in the same direction.

The coefficient estimates of the regression results are given in Table 3. The R^2 and the standard error of the equation (S.E.E.) show that the equations fit the data quite well. The Durbin (h) statistic calculated for each equation suggests absence of significant first-order autocorrelation.[19]

The possibility of a reverse causation from productivity to R&D expenditure is also tested. Irrespective of the productivity measure used, the null hypothesis that productivity growth does not cause R&D expenditure growth cannot be rejected at a reasonable level of significance.[20] These results along with the findings reported in Table 2 indicate the presence of a unidirectional causality from R&D expenditure to productivity. Hence the change in the growth rate of productivity can be, at least partly, attributed to the change in the growth rate of R&D expenditure. These results are consistent with the findings reported in Brinner, Kendrick, and Mansfield et al. and are contrary to the results reported in Scherer, Griliches, Bosworth, and Denison.[21]

Further analysis is done by examining the effects of the growth rate of R&D expenditure on the growth rate of different measures of productivity. This is done by estimating dynamic multipliers using dynamic simulation of the estimated equations. Initially, a base dynamic simulation using historical data for all variables is performed. Then a dynamic simulation is run with the growth rate of R&D expenditure increased by 1 percent above its historical

Table 3
Coefficient Estimates of the Regression Equations

	Productivity Measures		
	National Income	National Income/ Person Employed	National Income/ Hour of Work
Constant	0.68 (3.61)	1.20 (0.87)	0.77 (1.26)
b (-1)	0.73 (1.66)	1.62 (2.68)	0.06 (1.20)
b (-2)	1.02 (0.81)	0.71 (3.66)	0.16 (1.32)
c (-1)	0.86 (2.68)	0.33 (2.91)	0.25 (4.78)
c (-2)	0.09 (3.14)	0.47 (3.86)	
c (-3)	0.42 (2.41)	0.30 (3.04)	
Summary Statistics			
R^2	0.40	0.38	0.46
S.E.E.	0.02136	0.001468	0.012016

* Figures in parentheses besides the coefficient estimates represent the t-statistics.

values; historical data is used for the other variable in the equation. The difference between these two simulations give an estimate of dynamic multipliers for R&D expenditure for each period. These multipliers should be of interest to researchers because the multipliers describe the effects and timing of R&D spending on the various measures of productivity. The results are presented in Table 4.[22]

The figures in each column in the Table represent the responses of various measures of productivity at the indicated period (in the column headed by period) to a 1 percent change in R&D spending. The responses are expressed in percent of changes. Responses for four periods are presented here. Irrespective of the productivity measure employed, a positive shock to R&D spending has a positive impact on productivity in all the periods reported here.[23] A shock to R&D spending initially raises National Income. The peak effect occurs in the second period when a 1 percent change in the growth of R&D expenditure leads to a 0.26 percent change in National Income. The effect gradually declines in the third period and becomes extremely small in the fourth period. A similar trend exists for National Income per person employed and National Income per hour of work. The peak effects occur in the second period and gradually become negligible at the end of the fourth period. The magnitude of the peak effect for these two variables is also similar to that of National Income. Thus R&D expenditure has a lag effect on these three measures of productivity and the effect usually lasts for three periods. Moreover, the immediate effect of a 1 percent growth in R&D expenditure on the three different measures of productivity is significant. These results reinforce the earlier findings that a unidirectional causality exists from R&D expenditure to various measures of productivity.

Summary and Conclusions

Results from this study suggest that there exists a causal relationship between various productivity indices and R&D expenditure. The Granger causality concept is used to test the hypotheses drawn from the existing literature in the field. The results show positive effects of changes in R&D expenditure on three different

Table 4
Dynamic Multipliers for R&D Expenditure

Period	National Income	National Income/ Person Employed	National Income/ Hour of Work
1	0.18	0.19	0.12
2	0.26	0.24	0.28
3	0.12	0.19	0.11
4	0.04	0.06	0.07

measures of productivity growth. Data for this study cover the period 1956-83 which includes cycles of growth and decline in R&D expenditure and productivity.

The study shows that changes in R&D expenditure affects the growth rate of three different measures of productivity with varying degrees of intensity. National Income per hour of work shows a much higher R^2 than National Income or National Income per person employed. This suggests that R&D expenditure may have induced an expansion in productive employment. A further analysis of data reveals that a positive growth rate in the R&D expenditure caused different lag effects, intensity, as well as growth cycle effects on various productivity indices. Growth in R&D expenditure has an instantaneous positive effect on all productivity measures. However, the intensity of the contribution and the growth cycle effect vary greatly between the measures. National Income per hour of work shows the highest growth rate, with the peak effect occurring in the second year and maintaining a high growth rate through the fourth year. National Income shows the second highest growth rate in response to a positive shock to changes in R&D expenditure. The peak effect again occurs in the second year. National Income per person employed also peaks in the second year. The growth rate of all three measures decreases significantly in the fourth year. These results provide support to the observation that R&D expenditure causes expansion in the employment sector of the economy. It can be concluded from the findings of this study that productivity and economic growth is a function of R&D expenditure, which supports the popular belief. In order to achieve a higher employment goal, the policy makers should consider the vital role of R&D expenditure in the expansion of employment opportunity.

The findings of this study will be of interest to the planners and policy makers in different ways. The results indicate that using only the trend analysis of the productivity variables may not be the best way to project economic growth. Along with other variables, the projected levels of investment in R&D should also be taken into account. Furthermore, the lag and cycle effect shown here indicate that the impact of R&D expenditure on productivity has a time lag of one year; reaches its peak within 2 years and then falls. This suggests that productivity in different sectors will be better maintained if a time lagged continuous plan of R&D investment is adopted, instead of one based on the need for and availability of resources.

Finally, it also suggests some implications for accounting policy decisions. FASB 2 requires companies to show R&D expenditures in the year in which they are incurred.[24] This policy does not support the 'matching revenues with expenses' principle in accounting. As the contribution of R&D investment is felt after a time lag of one year and as its effects continue for some subsequent time period, results from this study provide an argument for capitalizing R&D expenditure and amortizing it over its productive life.

It should be noted that this study did not investigate the question: How do R&D expenditures cause increases in productivity growth. However, it can be argued that R&D expenditures contribute to productivity through advances in the knowledge base that controls the pace of development of new products, processes, and technological innovations. These enhance the

productive efficiency of factors of production, and make more resources available for new investments. This, in turn, expands employment opportunities and results in increases in per capita National Income.

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[3]In addition to Denison and Scherer, see Zvi Griliches, "Productivity and Technical Change," *National Bureau of Economic Research Reporter*, Spring 1983; Barry P. Bosworth, "Tax Incentives and Economic Growth," Brookings Institute, 1984.

[4]John W. Kendrick, "Productivity Trends and the recent Slowdown: Historical Perspective, Causal Factors, and Policy Options," *Contemporary Economic Problems*, (Washington, D.C.: American Enterprise Institute for Public Policy Research), 1979; and Edwin Mansfield, A. Romeo, M. Schwartz, D. Teece, S. Wagner and P. Brach, *Technology Transfer, Productivity, and Economic Policy*, (Norton), 1982.

[5]The non-residential business sector includes business firms involved in the production process.

[6]Clive W. J. Granger, "Investigating Causal Relations by Econometric Models and Cross-Spectral Methods," *Econometrica*, July 1969, 424-38.

[7]William D. McMillin, "Federal Deficits, Macrostabilization Goals, and Federal Reserve Behavior," *Economic Inquiry*, 24, April 1986, 257-269.

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[9]Zvi Griliches, "Returns to Research and Development Expenditures in the Private Sector," in John Kendrick and B. Vaccara (eds.) *New Developments in Productivity Measurement and Analysis*, The University of Chicago Press, Chicago, 1980.

[10]Scherer (1982, pp. 215).

[11]Kendrick (1979).

[12]Mansfield et al. (1982).

[13]For a more detailed discussion of this issue, see Griliches (1983). See also N. E. Terleckyj, "Direct and Indirect Effects of Industrial Research and Development on the Productivity Growth of Industries," in John Kendrick and B. Vaccara (eds.) *New Developments in Productivity Measurement and Analysis*, The University of Chicago Press, Chicago, 1980; and A. N. Link, *Research and Development Activity in U.S. Manufacturing*, Praeger Publishers, New York, 1981.

[14]Mansfield et al. (1982).

[15]The Granger test is simple, straightforward and saves degrees of freedom. The limited number of observations available is an important consideration in using this test. To economize space, the estimation procedure for causality testing is not discussed here. Interested readers are referred to McMillin (1986) and the references therein. The Granger test is used with the usual misgivings, see, for example, R.K. Conway, P.A.V.B. Swamy, J.F. Yanagida, and P. Muchlen, "The Impossibility of Causality Testing," *Agricultural Economics Research*, Summer 1984, 1-19.

[16]For a detailed discussion of the rationale for using the FPE criterion, see, McMillin (1986) and Dan Thornton and Dallas S. Batten, "Lag Length Selection and tests of Granger Causality between Money and Income," *Journal of Money, Credit and Banking* 17, 1985, 164-78.

[17]The time series data on various productivity measures are taken from Edward Denison: *Trends in American Economic Growth*, 1929-1982, Tables 2-1 and 2-2. The data on R&D expenditure is taken from the Statistical Abstract of the United States 1985 published by the U.S. Department of Commerce (pp. 577-580).

[18]It has been argued that the bivariate Granger-causality test may be biased due to omitted variables. See, for example, McMillin (1986). However, Yamada have shown that it is very costly in terms of degrees of freedom to include more variables and/or more lags in the system when only a small number of observations are available to test the Granger causality. See, Tadashi Yamada, "Causal Relationships Between Infant Mortality and Fertility in Developed and Less Developed Countries," *Southern Economic Journal*, 52, October 1985, 364-370.

[19]Since the lagged values of the dependent variable are used as regressors, the Durbin-Watson Statistic becomes meaningless and, hence, is not reported here.

[20]To economize space, these results are not reported here but are available from the authors upon request.

[21]Kendrick (1979) and Man field et al. (1982); for an opposing view, see, Scherer (1982), Griliches (1983), Bosworth (1984), and Denison (1985).

[22]Dynamic multipliers have also been calculated by reducing the growth rate of R&D expenditure by one percent below its historical value. The results are very similar to those shown in Table 3. Hence they are not reported separately.

[23]A positive shock to R&D spending implies a 1 percent increase in the growth rate of R&D above its historical value.

[24]'Financial Accounting Standard Board' (FASB) Statement of Financial Accounting Standards No. 2, *Accounting for Research and Development Costs* (Stanford, FASB 1974. Two of the reasons cited by the FASB for arriving at its decision to expense the R&D is, first, lack of causal relationship between the expenditures and benefits and, second, matching of revenues and expenses.

Just-In-Time: Implications and Applications for Purchasing

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Introduction

Just-In-Time (JIT) is a philosophy. It is a concept, a body of principles that underlies the successful operation of a manufacturing business. A basic principle of JIT is that the production rate must equal the demand (sales) rate. The purpose is to produce only what is needed, no more or no less. The key to the JIT message is its mandate for continuous improvement in everything we do, for the steady reduction of waste in all forms, time, material, labor, factory space or any resource. JIT is not a software package with a promise to deliver us from the Japanese. Just-In-Time is no more than a philosophy that pushes us to purchase:

- The products customers want
- When the customers want them
- With perfect quality and
- With little or no waste.

Since 1980, a growing number of U.S. firms have adopted JIT techniques in production and purchasing. While JIT-based operations have a definite impact on production planning, scheduling, equipment setup, maintenance, quality control, receiving, inventory, shipping and customer service, it is perhaps the purchasing function that undergoes the most changes from the implementation of Just-In-Time. The focus of this paper is on the changes the purchasing function will undergo and the impact that this will have on the rest of the organization.

Purchasing for Just-In-Time

The role of purchasing for Just-In-Time is perceived as an inventory reduction program. The basic premise of JIT purchasing is that materials must be delivered from suppliers at the exact time they are needed. The objective is to remove the large stocks of inventory that have traditionally been stored in warehouses. Michael Evans, consulting economist for the American Production and Inventory Control Society, estimates that up to 40 percent of all industry's business assets are tied up in inventory.[1] JIT purchasing shifts the responsibility of stocking inventory to the supplier and requires frequent deliveries, often daily or more than once daily.

JIT purchasing differs from traditional methods mainly in its treatment of variables which are often considered uncontrollable in conventional applications as true decision variables.[2] Suppliers are generally converted on a phased basis, with the highest-value parts suppliers converted first. The number of suppliers is usually reduced. Benefits do occur to suppliers as well as to manufacturers since a more consistent long-term demand for

their products is one result of a JIT supplier relationship.

One must realize that not all products going into the production process are for Just-In-Time purchasing as practiced today. Major corporations including Hewlett-Packard, Kawasaki, Nissan and General Motors use some form of classification system for JIT purchasing. This process usually involves categorizing parts and components according to value and storage requirements. Items that are high-tech, custom-made and of high dollar value are most suitable for JIT. Also, items that require a large amount of storage space and carrying cost should be purchased under JIT. Items that are inexpensive and have low storage requirements will probably not be cost efficient for current JIT purchasing. General Motors' Buick division uses approximately 600 suppliers. Of this number, only 85 suppliers work under a JIT arrangement with Buick and deliver parts on a daily basis.[3]

Buyer/Supplier Relationship

Just-In Time purchasing requires a new and unique relationship between the buyer and supplier. The traditional role has often been regarded as an adversarial relationship with the vendor perceived as trying to out-smart the buyer, and the buyer always pushing the supplier for lower prices. Because JIT relies heavily on the supplier, emphasis is placed on developing an almost partnership-like business arrangement.

To accomplish this essential cooperative relationship with vendors, many companies involved in JIT programs are turning from multiple-suppliers to a single-source supplier. This arrangement normally is an evolutionary process in which vendors are researched for performance measurements such as quality of product, number of on-time deliveries, product information provided, etc. Following a study of past performance, one vendor is normally selected to be the chief supplier with the second ranked vendor being used as a backup.

One of the keys to establishing excellent vendor relations is to eliminate the old bidding wars and pricing battles. The emphasis of JIT shifts from bottom line "price" to bottom line "costs" of doing business with a supplier. A vendor may be able to give the lowest price, but if deliveries are not made on time, downtime is experienced and waste is incurred. Buyers and materials managers must take into consideration all aspects of a vendor's performance in making supplier choices.

A number of major U.S. companies have put into practice "certification" programs to research, rank and choose vendors. One such program at Rockwell International was instituted to find vendors who could supply defect-free components at reasonable prices to flow without inspection into the assembly line. Rockwell's definition of a certified supplier is stated as follows: "one whose price is competitive, who is committed to improving quality, in whose components Rockwell is confident enough to not have to inspect, and whose products can be delivered pretty much on demand." Successful implementation of the certification program has allowed Rockwell to "weed-out" suppliers who were not up to their standards. Their immediate goal is a 20 percent reduction in the vendor base by next year.[4]

Moving toward single suppliers is a function of JIT purchasing that requires a

major commitment on the part of the supplier. Buyers are searching for suppliers who are willing to be involved in the total operations of the company from product design to production of the finished good. Vendors are chosen based not only on quality, price and delivery, but also on aspects such as: product design involvement, technical assistance provided, product standardization and value analysis. This heavy involvement between buyer and supplier will enhance the "partnership" agreement and result in more satisfactory products being supplied to the organization.

Supplier Training

The commitment between buyer and supplier should be a reciprocal agreement. For a company to implement Just-In-Time purchasing and move toward single-supply sources, it must be prepared to train the supplier to meet its needs. An objective of training is to ensure that suppliers thoroughly understand the main purpose for implementing JIT purchasing in the buyer's organization.

There are three approaches available for training suppliers in JIT purchasing. The first approach consists of an extensive one-time presentation and group discussion of the JIT concept at the supplier's plant. Included should be representatives from functional areas such as production, engineering, traffic and quality control. The second approach consists of continuous training at the supplier's plant. The buyer's firm sends selected quality control and engineering personnel to a supplier's plant to provide required training and technical assistance to bring the supplier's product quality up to the buyer's standards. The third approach, which is less specific, would involve a periodic "vendor day" for JIT suppliers at the buyer's plant to improve understanding and cooperation between buyer and seller.[5]

Statistical Process Control

Process Control methods are used to monitor quality characteristics during the manufacturing production process. These methods and standards need to be taught to the vendor. An increasing number of companies are training suppliers on methods of statistical process control in the supplier's plants. By teaching quality standards to suppliers, JIT buyers aim at reducing or alleviating the need for on-site inspection of the vendor's product. This allows the uninterrupted flow of these materials into the manufacturing process.

Statistical process control provides quality performance feedback on a continuous basis on work-in-process. Process control charts are developed for the products and remain with the product at all times. This assures that products coming off the supplier's production line are made to the buyer's standards and those that don't meet standards are never delivered to the buyer's plant.

Following the implementation of quality control in their plant, it is advisable for members of the buyer's firm to also train the supplier on JIT techniques. The benefits of this cross-training should be increased product quality, quicker deliveries, and better prices for the buyer's firm.

Problems Encountered in JIT Purchasing

While most buyers agree that JIT purchasing will continue to be the direction of

the future, they are aware that it is not accomplished without overcoming some very challenging obstacles. In recent research involving JIT purchasing,[6] 47 percent of the major U.S. manufacturers surveyed indicated that they had encountered significant problems with a number of their suppliers. Listed below are four reasons why suppliers do not fully support JIT purchasing programs:

- Little or no incentive to adopt JIT delivery. Suppliers are hesitant to commit to JIT delivery unless they are assured of greater benefits than are normally received in the traditional buyer-seller relationship. Resolving this conflict should include the previously mentioned supplier training program. This effective cross-communication process can enhance the understanding of buyer needs for the JIT production system.
- Lack of commitment from buyers. Suppliers feel that buyers are constantly pressing for lower prices and increased services and will continue to stimulate competition among several suppliers to accomplish these goals. To reassure suppliers of their commitment, many companies are now entering into contractual agreements with suppliers for a determined or indefinite period of time. The agreement is based on the provision that the supplier continue to meet product requirements.

While these contractual agreements are intended to serve a valuable purpose, there are some legal complications if either party fails to comply with the terms of the contract. Both buyer and seller must closely investigate the possible benefits and consequences of the arrangement before entering into it. The Japanese have steered clear of contractual arrangements and normally rely on hand-shake agreements to meet JIT supply requirements.[7] Among the complications are:

- Considerable strain on suppliers. Suppliers are not accustomed to continuous scrutiny from buyers. Under JIT purchasing they are constantly being pressured by buyers to deliver quality products at the right price and at the right time. Often, companies that have entered into single-source supplier agreements will allow a vendor only one chance to "prove" that it can produce the product. If the vendor fails to meet mutually agreed upon requirements, the buyer searches for a new source. This pressure can also be remedied by buyer-supplier training programs.
- Considerable strain on accounting. Traditionally, accounting systems require purchase orders each time material is ordered from a vendor. Each physical receipt of material and accompanying invoice must be matched with a purchase order. The technique worked effectively when a part was only ordered 2-6 times a year. The JIT system is based on a "pull" system related to demand. Rather than deciding on the most efficient production lot sizes and manufacturing according to those lot sizes with a batch-push system, customer demand determines production lot sizes. As inventories are withdrawn in smaller lot sizes it requires more frequent deliveries of the same part, sometimes two or three times a day. Separate purchase orders for each receipt would cause a flood of paperwork. The purchasing and

receiving people would drown in the paperwork. So would the suppliers. And certainly, the Accounts Payable department can't be writing two or three checks a day for the same item. More frequent deliveries from the suppliers may require changes in the accounting system to continue paying the bills without separate purchase orders for every receipt.

The vendor making frequent deliveries has the same problem. He certainly can't afford to send two or three invoices every day for the same item. The Accounts Receivable systems must be modified to accommodate frequent shipments without frequent billings.

Many companies implementing JIT today are just beginning to feel the impact on their financial systems. These are solvable problems. In some cases they involve significant changes in the financial systems to keep up with the operating systems. It is important to involve the financial people early in the JIT education and discussions. Give them the opportunity to evaluate the impact of JIT on the entire organization and the financial systems as well.

Transportation Costs and Requirements for JIT

While purchasing agents are in agreement on the benefits of Just-In-Time for reducing inventory storage costs, many fear that these savings are offset by increased freight costs due to more frequent deliveries. Because freight can add significantly to the cost of producing a product, it is necessary for buyers to learn to manage and control these costs.

Effective means of managing transportation requires buyers to take a proactive role in controlling the costs involved in Just-In-Time deliveries. Two approaches have been relatively successful for several major U.S. companies.

The first approach focuses on developing a freight consolidation program. This involves getting several JIT suppliers to ship using the same delivery vehicle. This approach has worked well for companies such as the Buick plant in Flint, Michigan where suppliers are located in the same relative proximity.

The second approach involves concentrated efforts to deal with suppliers in the local area. Often, large buyers are successful in influencing major suppliers to locate their plants close-by. An example of this is the Hoover Company, a sole-supplier of truck seats for Nissan, who built a new plant near the Nissan plant in Tennessee. Usually the incentive to make this drastic move is a long-term or indefinite supplier contract.[5]

Buyers: Conflicts Between the Old and the New

The concept of single-source, JIT purchasing often contradicts the traditional role of the buying function. Buyers have always in the past been concerned with the process of competitive pricing. This was seen as the means of allowing the market to operate and set product prices. In the JIT environment the primary emphasis is on total service with price being a secondary consideration. Many conservative buyers and managers are concerned that the lack of competitiveness in JIT will allow suppliers to adjust product prices upward and ultimately cause lower profit margins.

However, researchers who have studied the influences of JIT on product prices have determined that the cost effectiveness of single-source suppliers should hold prices stable. Sole-suppliers under a JIT agreement are better able to plan their own plant capacity and actual output. Also, if suppliers adopt statistical process control and/or JIT production in their own plants, their cost per unit of production should go down. In an effective buyer-supplier relationship, these cost savings will be passed on to the buyer's firm.[9]

The trend throughout U.S. industry toward Just-In-Time production and purchasing provides a challenging opportunity for buyers. Never before in the history of manufacturing has the role of the buyer been so critical to the effectiveness of the organization. To meet the future demands of the JIT purchasing function, buyers must be prepared to adopt the techniques of selecting suppliers, controlling costs and quality, and insuring on-time deliveries.

The purchasing function has evolved into a professional area of expertise that is highly regarded in the business organization. Important to the buyer's success is the realization that suppliers are extensions of their own production system. A supplier should be viewed as a function that requires the same type of planning and control process as other functions within the buyer's organization.

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[1]Ernest Raia, "Just-In-Time USA," *Purchasing*, February 13, 1986, Vol. 100, No. 3, pp. 48-62.

[2]C.K. Hahn, P.A. Pinto, and D.J. Bragg, "Just-In-Time Production and Purchasing," *Journal of Purchasing and Materials Management*, Fall 1983, Vol. 19, No. 3, pp. 2-10.

[3]A. Ansari, and Jim Hechel, "JIT Purchasing: Impact of Freight and Inventory Costs," *Journal of Purchasing and Materials Management*, Summer 1987, Vol. 23, No. 2, pp. 24-28.

[4]Ernest Raia, "Just-In-Time USA: Journey to World Class," *Purchasing*, September 24, 1987, Vol. 103, No. 5, pp. 48-77.

[5]A. Ansari and Batoul Modarress, "Just-In-Time Purchasing," *Journal of Purchasing and Materials Management*, Summer 1986, Vol. 22, No. 2, pp. 11-15.

[6]Ansari and Modarress, "Just-In-Time Purchasing."

[7]Rai, "Just-In-Time USA: Journey."

[8]Ansari and Hechel, "Just-In-Time Purchasing."

[9]Chan K. Hahn, Kyoo H. Kim, and Jong S. Kim, "Costs of Competition: Implications for Purchasing Strategy," *Journal of Purchasing and Materials Management*, Fall 1986, Vol. 22, No. 3, pp. 2-7.

A Reader Responds: The 1986 Tax Act and Real Estate Investment

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An article appeared in the *Arkansas Business and Economic Review* recently entitled, "How the Tax Reform Act of 1986 Will Stimulate Sole Proprietorship, Partnership, and Subchapter S Corporation Capital Investment: A Commercial Real Estate Example."[1] The purpose of this response is to point out that most tax experts believe that real estate investments will be reduced contrary to the conclusion in the cited article that investment activity will be stimulated by changes in the tax laws.

This writer agrees with the notion that the new laws create some serious disincentives to real estate investment. The professors at Samford University who wrote the article do not appear to have considered certain elements of the new tax Act which would have led to results quite opposite to that expressed by the authors. They assert that when real estate investments are put in net present value (NPV) context the new tax laws will increase NPV returns up to 46 percent. While this writer has no dispute with the net present value approach, he does feel that key factors with respect to real estate investment have been ignored. Basically, there are four elements that have not received adequate attention in the article. These are: (1) excessively high rates of return; (2) uncertainty of returns over the long run; (3) failure to consider that returns are "passive income" under the new law, and in most instances cannot be written off against ordinary income; and (4) differences in Capital Gains treatment in the new tax act versus the old tax laws.

Excessively High Rates of Return

The article showed a hypothetical investment as follows:

Cost of Project	$100.00
Asset life (real)	35 years
Annual incremental Earnings Before Depreciation & Taxes	$50.00
Investment Tax Credit	10%
Net Cost	$90.00
Depreciable Base	$95.00

The main concern here is the $50 annualized gross return. Any real estate investment that shows a two-year payout, will not be affected by any tax laws. Who would be concerned about taxes when the return is so generous? I know of no gross returns this high in the real estate sector. An expectation of 5 percent to 10 percent gross is more likely.

Uncertainty

To assume a 50 percent gross yield over the next 35 years is very unusual. Many investors in commercial real estate might be deterred from investing based on the uncertainty of rents, occupancy rates, taxes,

maintenance costs over a 35 year time span.

Passive Losses Significantly Restricted Under 1986 Tax Act

At the heart of the new tax bill is a tough provision that would prevent taxpayers from using paper losses generated by tax shelters to reduce tax liability. The new rules interpret income from real estate as "passive income." Passive losses from limited partnerships and Subchapter S corporations cannot be used to offset income from other sources, such as salary and portfolio income. In addition, all rental income including, but not limited to, real estate, would be subject to the loss-limitation rule regardless of whether the taxpayer participates in managing the property. It is these provisions in the law which are likely to reduce the investment in real estate. These rules are a heavy blow to the real estate industry which frequently finances development through limited-partnership arrangements that provide tax losses to investors during the early years of a project.

Capital Gains Taxes

The new Act increases Capital Gains taxes substantially. Gains are taxed as ordinary income. While the authors of the article say (in a footnote) that capital gains is not relevant to NPV computations, it is actually an important consideration for any investor to estimate the net return after all taxes are included. Since it is a future cost, it can easily be factored into any NPV calculation. This writer is of the opinion that Congress will reduce the capital gains tax in 1989, as it has had a significant impact on reducing tax revenues to the Federal Government.

Construction Index Data

Commercial construction starts, taken from the September report of leading economic indicators,[2] tend to confirm that construction is reduced. The indexes for new construction for July and August 1987 are 77.0 and 77.5, respectively. The indexes for these months in 1988 are 74.2 and 77.6, respectively. The average for the last half of 1987 is 78.7, while the average for the first half of 1988 is 76.62. This trend is not definitive. More observations would be needed to establish a statistical downtrend. It should also be noted that many people were already committed to limited-partnerships and Subchapter S arrangements prior to the changes of 1986. It may be several years before it is precisely known just how seriously the new tax laws have affected commercial real estate activity.

For the above reasons, this writer does not agree that the 1986 Tax Act will provide a significant stimulus for commercial real estate in the future.

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[1]Fred Hendon, Chad Denson, Gene Grant, Jennings Marshall, "How the Tax Reform Act of 1986 Will Stimulate Sole Proprietorship, Partnership, and Subchapter S Corporation Capital Investment," *Arkansas Business and Economic Review*, Vol. 21, No. 1, pp. 14-17.

[2]*Economic Indicators*, September, 1988, United States Government Printing Office, 1988, p. 19.

Editor's Note:

Reference is made to the article, "Arkansas Gross State Product: Estimates for 1960 - 1985" published in the *Arkansas Business and Economic Review*, Volume 21, Number 1, 1988.[1] The opening sentence of the second paragraph of page 1 of the Review reads as follows,

> "At the state level, no comparable measure of economic activity is prepared by the Department of Commerce."

That statement became incorrect with the publication of the article, "Gross State Produce by Industry, 1963 - 86," in the May 1988 issue of the *Survey of Current Business*.[2]

The gross state product data have also been distributed on personal computer diskettes on which the GSP is given in both constant (1982 = 100) and current dollars in millions. They are available for purchase from the Economic and Statistical Analysis/BEA, U.S. Department of Commerce. The data on Arkansas is included on the diskette with ESA/BEA accession number: BEA REA 88-406.

The total Arkansas GSP figures from the diskette for the years 1963 - 1986 are listed below for your information:

Total GSP: Arkansas

Year	Constant Dollars (Millions)	Current Dollars (Millions)	Year	Constant Dollars (Millions)	Current Dollars (Millions)
1963	12186	3858	1975	19024	11551
1964	12988	4194	1976	20277	13010
1965	13577	4497	1977	21410	14665
1966	14336	4946	1978	23063	17154
1967	14779	5249	1979	23501	18911
1968	15283	5755	1980	23210	20123
1969	15387	6153	1981	24134	22885
1970	15392	6485	1982	23462	23462
1971	16177	7216	1983	24415	25394
1972	17702	8336	1984	25612	28716
1973	18825	9756	1985	27159	29926
1974	19287	10767	1986	28168	31633

[1]Philip F. Rice and C. Michael Impson, "Arkansas Gross State Product: Estimates for 1960-1985," *Arkansas Business and Economic Review*, Vol. 21, No. 1, pp. 1-13.

[2]Vernon Renshaw, Edward A. Trott, Jr., and Howard L. Friedenberg, "Gross State Product by Industry 1963 - 86," *Survey of Current Business*, Vol. 68, No. 5 (May 1988), published by U.S. Department of Commerce/Bureau of Economic Analysis, pp. 30-46.

Selected Arkansas and U.S. Economic Indicators

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1988: A Better Year Than Earlier Expected

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After major concerns with regard to the effect of the drought during the early summer, the agricultural sector is now the bright spot in the Arkansas economy. As a result of higher prices of some commodities, particularly soybeans, many of the farmers even with lower per acre yields will enjoy higher revenues in 1988. The generally improved conditions among the crop producers, coupled with renewed strength in poultry, will move the economic situation among Arkansas farmers in a somewhat contra-fashion to movements in other sections of the country. The data for early 1988 were already exhibiting such behavior which is likely to have continued throughout the year.

After rising almost continuously for several months, the civilian labor force dropped by almost 40,000 from April through September. At the same time, total employment declined by 44,000 workers. Thus, the unemployment rate was generally rising through the middle part of the year. Offsetting somewhat this disappointing development was the fact that manufacturing wage and salary employment was running substantially higher in 1988 than it was in the same months of 1987.

Following the sharp decline in the first quarter of the year, industrial production rebounded in the second quarter and then followed with a relatively stable third period. Thus, to date industrial production is running slightly ahead of 1987 and should round out the year with an advance of approximately two percent.

Waterborne commerce on the Arkansas River is down sharply. Inbound tonnage declined to its lowest level since the last recession, while outbound tonnage dropped to its lowest point of the 1980's. While low water levels may have attributed somewhat to the reduced tonnage flow, this onset was prior to the summer drought period.

Construction activity, both nonresidential and residential, appears to have persisted at below 1987 levels throughout the year. Reported residential construction has declined to levels experienced during the last recession and nonresidential construction contracts are only slightly better in relative performance. The former, however, may be largely due to shift in homebuilding to locations not requiring building permits. To the extent that this assumption is correct, residential construction volume is being understated.

The expectations for growth in Arkansas Personal Income during 1988 are now somewhat improved from that of only one or two months ago. Manufacturing employment and the brightened agricultural situation are both contributing factors, as well as is the likelihood that residential construction performance is

superior to that reflected by the data. In nominal terms it appears that Personal Income should, for the year, grow at a nominal rate in excess of five percent.

Concerns for the national economy persist. There may be signs of at least some increase in the rate of inflation and many economists are now forecasting somewhat lower real growth rates for 1989. Downward pressure on the dollar and the national deficit continue to be major problems. Both issues must be addressed by the incoming political administration and any forecast for the next few months can only be based on guesses as to what those upcoming administrative policies will be.

Labor Force and Employment

Arkansas

(Seasonally adjusted)

Year	Month	Civilian Labor Force (Units)	Total Employment (Units)	Agricultural Employment (Units)	Manufacturing Wage and Salary Employment (Units)	Unemployment Rate (Percent)
1980		999,000	923,000	65,100	210,000	7.7
1981		1,030,000	936,000	64,100	212,000	9.1
1982		1,018,000	919,000	63,440	196,000	9.8
1983		1,026,000	920,000	62,395	200,000	10.1
1984		1,044,000	951,000	61,600	210,000	8.9
1985*		1,051,000	960,000	46,250	210,000	8.6
1986		1,066,000	973,000	45,515	214,000	8.8
1987		1,088,000	1,000,000	45,000	219,000	8.1
	Oct.	1,101,089	1,009,283	43,835	224,155	8.1
	Nov.	1,108,680	1,019,261	44,016	224,681	7.9
	Dec.	1,121,986	1,032,291	44,116	224,851	7.9
1988	Jan.	1,119,291	1,034,813	44,673	224,359	7.9
	Feb.	1,130,871	1,047,587	44,815	225,466	7.6
	Mar.	1,135,903	1,048,624	44,905	226,082	7.6
	Apr.	1,136,610	1,050,605	44,800	225,783	7.7
	May	1,131,175	1,039,309	44,406	224,648	8.3
	Jun.	1,124,843	1,035,291	44,144	227,506	7.9
	Jul.	1,113,683	1,026,026	43,863	228,400	7.8
	Aug.	1,101,974	1,011,657	43,726	227,864	8.1
	Sep.	1,097,124	1,006,651	43,549	227,629	8.1

*Note: Labor Force and Employment data for the period 1985 forward have been reestimated by the Employment Security Division. The reestimation resulted in relatively large revisions in Agricultural Employment, with revisions to a less degree in Total Employment and Civilian Labor Force data. Consequently, the data for 1985 forward are not comparable to that for the prior period.

Personal Income

Quarterly Changes in Personal Income, Arkansas and United States

(Seasonally adjusted, Percent)

	1986 Q-IV thru 1987 Q-I	1987 Q-I thru 1987 Q-II	1987 Q-II thru 1987 Q-III	1987 Q-III thru 1987 Q-IV	1987 Q-IV thru 1988 Q-I	1988 Q-I thru 1988 Q-II
Arkansas	+ 2.9	+ 0.3	+ 0.6	+ 1.6	+ 0.4	+ 3.1
United States	+ 2.1	+ 1.6	+ 1.7	+ 2.8	+ 1.1	+ 1.7

Personal Income in Arkansas

(Seasonally adjusted, annual rate, Millions of dollars)

	1981	1982	1983	1984	1985	1986	1987	1988
Quarter								
Jan-Mar	18,648	19,432	20,729	23,410	25,125[R]	26,087[R]	27,223[R]	28,041[R]
Apr-Jun	19,088	19,766	21,134	22,922	24,578[R]	25,826[R]	27,314[R]	28,924
Jul-Sep	19,534	19,817	20,898	23,258	24,604[R]	26,174[R]	27,469[R]	
Oct-Dec	19,290	20,406	21,871	23,646	24,991[R]	26,452[R]	27,920[R]	
Annual	19,140	19,855	21,158	23,309	24,825[R]	26,135[R]	27,481[R]	

[R]Revised

Industrial Production

Quarterly Changes in Industrial Production Arkansas and United States

(Seasonally adjusted, Percent)

	1987 Q-II thru 1987 Q-III	1987 Q-III thru 1987 Q-IV	1987 Q-IV thru 1988 Q-I	1988 Q-I thru 1988 Q-II	1988 Q-II thru 1988 Q-III
Arkansas	+ 1.9	+ 2.3	- 7.9	+10.4	+ 0.3
United States	+ 2.1	+ 1.7	+ 1.0	+ 1.1	NA

Value Added by Manufacture in Arkansas

(Seasonally adjusted, annual rate, Millions of dollars)

	1981	1982	1983	1984	1985	1986	1987	1988
Quarter								
Jan-Mar	7,167.6	7,474.8	7,884.9	8,824.6	9,278.8	9,525.8	10,139.4[R]	9,850.2[R]
Apr-Jun	7,388.1	7,569.1	8,131.9	8,959.7	9,282.1	9,661.5	10,257.6[R]	10,873.5[R]
Jul-Sep	7,601.8	7,581.8	8,398.0	9,078.2	9,351.9	9,758.6	10,454.9[R]	10,906.3
Oct-Dec	7,589.5	7,746.9	8,522.0	9,165.2	9,425.3	9,984.0	10,694.4[R]	
Annual	7,436.8	7,593.2	8,234.2	9,006.9	9,334.5	9,732.5	10,386.6[R]	

[R]Revised

Cash Receipts from Farm Marketings

Quarterly Changes in Cash Receipts, Arkansas and United States

(Seasonally adjusted, Percent)

	1986 Q-IV thru 1987 Q-I	1987 Q-I thru 1987 Q-II	1987 Q-II thru 1987 Q-III	1987 Q-III thru 1987 Q-IV	1987 Q-IV thru 1988 Q-I	1988 Q-I thru 1988 Q-II
Arkansas	+ 4.2	+ 11.9	- 0.8	- 6.5	+ 11.7	+ 16.2
United States	+ 1.5	+ 2.0	- 3.9	+ 4.6	- 5.9	

Cash Receipts from Farm Marketings in Arkansas

(Seasonally adjusted, annual rate, Thousands of dollars)

	1981	1982	1983	1984	1985	1986	1987	1988
Quarter								
Jan-Mar	3,023,940	3,399,389	2,741,619	3,521,324	3,363,628	3,085,598	2,964,346	3,431,543[R]
Apr-Jun	3,612,735	3,523,159	2,455,942	3,855,999	3,227,535	2,888,484	3,316,185	3,987,887
Jul-Sep	3,726,639	2,778,928	3,062,947	3,303,148	3,152,621	3,334,387	3,288,045	
Oct-Dec	3,203,139	3,315,654	3,084,389	3,233,516	3,439,215	2,844,038	3,073,323	
Annual	3,391,613	3,254,283	2,836,224	3,478,497	3,295,750	3,038,127	3,160,475	

[R]Revised

Waterborne Commerce:
McClellan-Kerr Arkansas River Navigation System

Quarterly Changes in Total and Internal Tonnages

(Seasonally adjusted, Percent)

	1987 Q-I thru 1987 Q-II	1987 Q-II thru 1987 Q-III	1987 Q-III thru 1987 Q-IV	1987 Q-IV thru 1988 Q-I	1988 Q-I thru 1988 Q-II	1988 Q-II thru 1988 Q-III
Total	+ 26.5	- 17.2	+ 7.5	+ 0.7	- 17.6	- 3.5
Internal	+ 5.0	- 14.9	+ 14.0	- 25.6	+ 6.7	+ 5.0

Freight Traffic

(Seasonally adjusted, annual rate, Thousands of short tons)

Time Period		Traffic Tonnages			
		Inbound	Outbound	Internal	Total[1]
1979		2,026	3,456	2,932	8,926
1980		1,611	4,643	2,408	9,133
1981		1,564	5,684	1,741	9,446
1982		1,520	4,611	1,561	8,258
1983		1,918	3,905	1,904	8,017
1984		2,128	4,264	2,433	9,490
1985		2,103	3,191	2,521	8,335
1986		2,608	3,453	2,962	9,703
1987[2]		2,131	3,348	2,752	8,885
	Oct-Dec	2,231	3,749	2,847	9,007
1988					
	Jan-Mar	2,808	3,259	2,118	9,071
	Apr-Jun	1,745	3,035	2,259	7,474
	Jul-Sep	1,752	2,506	2,371	7,213

[1]Total tonnage includes "through traffic."

[2]Sum of quarters does not equal annual totals because of moving seasonal adjustment factors.

Arkansas Construction Contracts

Residential Construction Contracts

(Seasonally adjusted, annual rate, Thousands of dollars)

	1981	1982	1983	1984	1985	1986	1987	1988
Quarter								
Jan-Mar	717,612	476,187	831,974	969,402	770,219	842,884	652,950	600,875
Apr-Jun	649,981	603,575	924,270	975,481	784,590	651,928	632,556	549,200
Jul-Sep	554,668	700,788	930,843	930,327	705,496	763,760	647,747	601,860
Oct-Dec	609,014	811,514	933,212	797,304	801,647	701,708	661,759	
Annual	632,818	648,016	905,075	918,128	765,488	742,570	648,753	

Nonresidential Construction Contracts

(Seasonally adjusted, annual rate, Thousands of dollars)

	1981	1982	1983	1984	1985	1986	1987	1988
Quarter								
Jan-Mar	363,356	389,417	286,833	461,592	386,837	476,516	400,391	392,002
Apr-Jun	279,378	212,698	359,775	444,186	411,369	328,485	483,757	294,073
Jul-Sep	252,037	306,050	370,032	507,932	454,883	541,870	420,714	260,301
Oct-Dec	307,569	213,596	449,173	450,036	562,806	311,998	323,122	
Annual	300,585	280,440	366,453	465,937	453,974	414,717	406,996	

ARKANSAS LABOR FORCE ESTIMATES
September 1988, Not Seasonally Adjusted

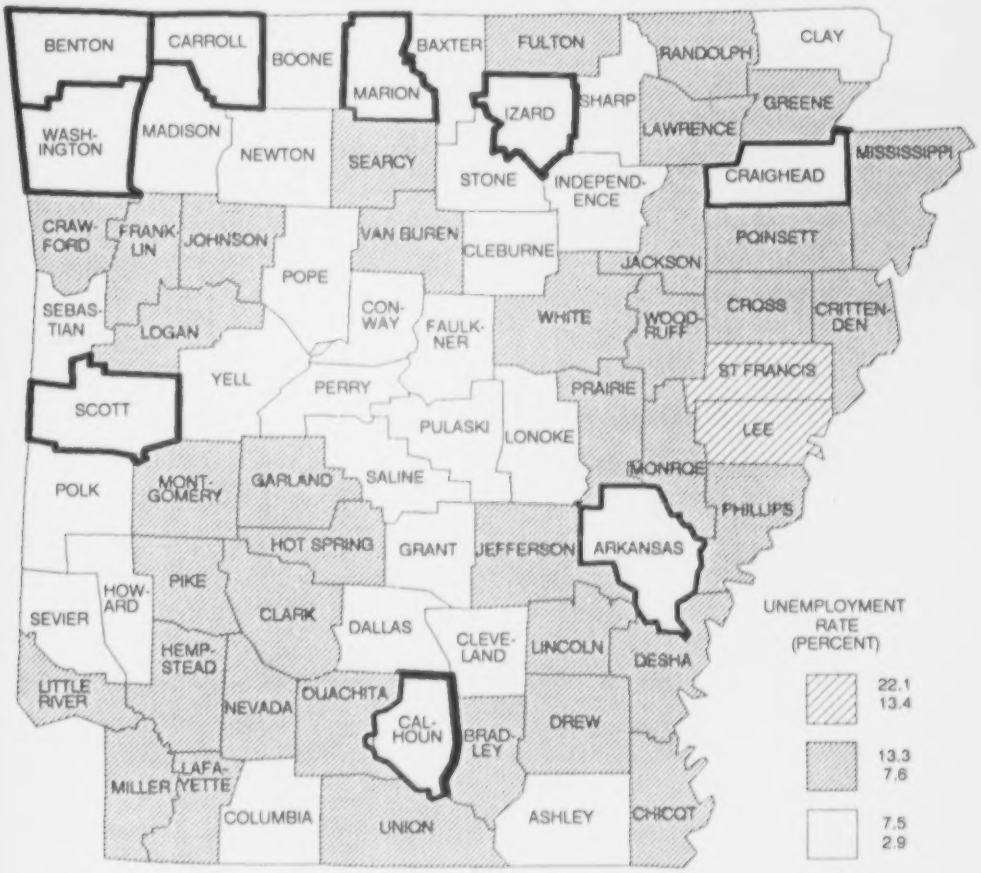
Area	Civilian Labor Force	Unemployment Rate	Total Employment
UNITED STATES	121,842,000	5.2	115,474,000
STATE OF ARKANSAS	1,116,200	7.2	1,036,000
Fayetteville-Springdale MSA	61,575	4.3	58,900
Fort Smith MSA	92,700	7.1	86,125
Little Rock-North Little Rock MSA	263,825	6.1	247,650
Pine Bluff MSA	37,075	8.3	34,000

County	Civilian Labor Force	Unemployment Rate	Total Employment	County	Civilian Labor Force	Unemployment Rate	Total Employment
Arkansas	10,675	4.4	10,200	Lee	4,750	17.9	3,900
Ashley	11,025	7.3	10,225	Lincoln	4,300	8.1	3,950
Baxter	11,125	5.8	10,475	Little River	5,225	8.1	4,800
Benton	50,875	3.9	48,875	Logan	9,375	8.5	8,575
Boone	14,975	6.0	14,075	Lonoke	17,325	6.1	16,275
Bradley	4,750	8.9	4,325	Madison	4,975	7.0	4,625
Calhoun	5,250	2.9	5,100	Marion	6,575	4.6	6,275
Carroll	10,600	3.8	10,200	Miller	17,625	7.7	16,275
Chicot	5,550	9.9	5,000	Mississippi	22,125	12.1	19,450
Clark	9,500	8.2	8,725	Monroe	5,150	7.8	4,750
Clay	8,600	5.8	8,100	Montgomery	2,875	9.6	2,600
Cleburne	8,350	6.9	7,775	Nevada	4,400	9.1	4,000
Cleveland	3,500	7.1	3,250	Newton	3,650	6.2	3,425
Columbia	12,200	6.6	11,400	Ouachita	13,850	7.9	12,750
Conway	7,800	6.7	7,275	Perry	4,375	6.9	4,075
Craighead	37,200	5.2	35,275	Phillips	9,650	11.4	8,550
Crawford	20,800	7.6	19,225	Pike	4,600	10.3	4,125
Crittenden	22,750	7.6	21,025	Poinsett	11,050	8.1	10,150
Cross	8,300	9.3	7,525	Polk	6,725	7.4	6,225
Dallas	4,325	5.8	4,075	Pope	23,675	5.4	22,400
Desha	7,425	8.4	6,800	Prairie	4,875	7.7	4,500
Drew	8,275	7.9	7,625	Pulaski	190,575	5.9	179,275
Faulkner	26,475	7.5	24,500	Randolph	7,450	8.4	6,825
Franklin	6,050	8.7	5,525	St. Francis	11,200	22.1	8,725
Fulton	3,900	8.3	3,575	Saline	29,450	6.3	27,600
Garland	31,000	8.5	28,375	Scott	5,825	5.2	5,525
Grant	6,175	6.5	5,775	Searcy	3,550	8.5	3,250
Greene	14,550	10.3	13,050	Sebastian	54,500	7.2	50,575
Hempstead	9,900	9.3	8,975	Sevier	6,500	6.5	6,075
Hot Spring	11,175	12.5	9,775	Sharp	6,050	6.6	5,650
Howard	5,925	6.8	5,525	Stone	3,975	5.7	3,750
Independence	16,100	7.3	14,925	Union	20,650	8.8	18,825
Izard	4,775	5.2	4,525	Van Buren	5,825	8.6	5,325
Jackson	8,300	13.3	7,200	Washington	61,575	4.3	58,900
Jefferson	37,075	8.3	34,000	White	25,825	8.7	23,575
Johnson	7,025	8.9	6,400	Woodruff	4,000	12.5	3,500
Lafayette	3,225	10.9	2,875	Yell	8,625	6.1	8,100
Lawrence	7,975	8.5	7,300				

Source: The Research and Statistics Section, Arkansas Employment Security Division, October 1988.

Labor Force Estimates
September 1988

In September, Arkansas' Civilian Labor Force rose 3,900 to total 1,116,200. Total Employment rose 8,000 to total 1,036,000. Thus, Unemployment fell 4,100 to 80,200. Of the 75 counties, Calhoun had the lowest unemployment rate, 2.9 percent, and St. Francis, the highest, 22.1 percent. The unemployment rate for the state, 7.2 percent, was the lowest for the year with 30 counties below the state rate. Ten counties however, had rates above 10 percent. Of the MSAs, Fayetteville-Springdale had the lowest unemployment rate, 4.3 percent, and Pine Bluff, the highest, 8.3 percent. The rates for the Little Rock-North Little Rock and Fort Smith MSAs were 6.1 and 7.1 percent, respectively.

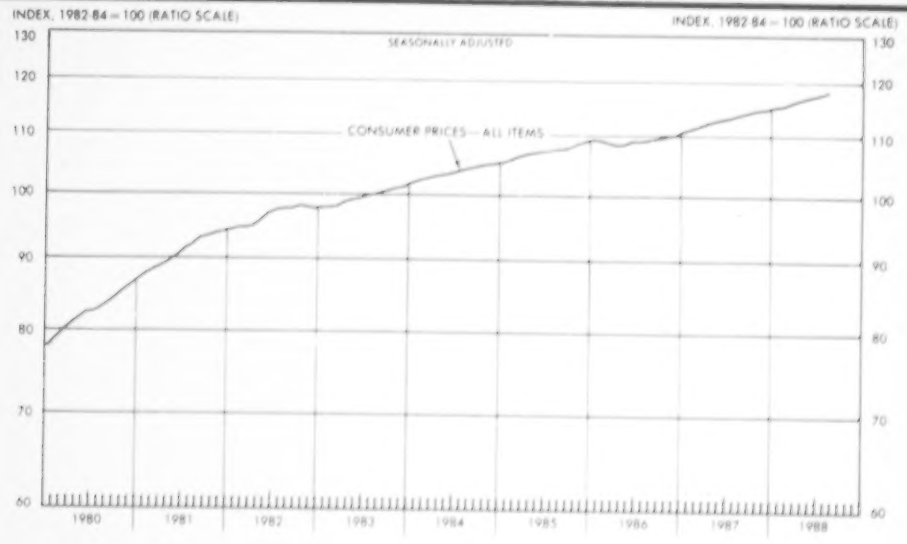


Boundary lines of counties having an unemployment rate less than or equal to the national average of 5.2%

Bureau of Business and Economic Research
College of Business Administration
University of Arkansas
Fayetteville, Arkansas 72701

CONSUMER PRICES—ALL URBAN CONSUMERS

In August, the consumer price index for all urban consumers rose 0.4 percent, seasonally adjusted and not seasonally adjusted. The index was 4.0 percent above its year-earlier level.



SEE NOTE ON TABLE BELOW
SOURCE: DEPARTMENT OF LABOR

[1982-84 = 100, except as noted; monthly data seasonally adjusted, except as noted]

Period	All items[1]		Housing						Transportation				Energy[2]	All items less food, shelter, and energy
	Not seasonally adjusted (NSA)	Seasonally adjusted	Food	Total[1]	Energy	Rent of primary residence (Dec 1982 = 100)	Household furnishings and operations (Dec 1982 = 100)	Medical care services (NSA)	Total[1]	New cars	Motor fuel	Medical care		
Rel. imp.[3]	100.0		16.1	42.5	27.8	7.9	10.7	9.2	17.2	9.3	15.3	4.4	4.4	5.8	7.6	48.5
1980	82.4		86.8	81.3	81.0			82.4	75.4	90.9	84.3	88.4	97.4	74.9	86.0	80.6
1981	90.9		93.6	90.4	90.5			90.7	90.4	95.4	91.2	93.7	108.5	82.9	97.7	88.3
1982	96.5		97.4	96.9	96.9			96.4	94.9	97.6	97.0	97.4	102.6	92.5	99.2	95.1
1983	99.6		99.4	99.5	99.1	100.0	102.5	99.9	100.2	100.2	99.3	99.9	99.4	100.6	98.9	100.0
1984	103.9		103.2	103.6	104.0	108.6	105.3	103.7	104.8	102.4	103.7	102.8	97.9	108.8	100.9	105.0
1985	107.6		105.6	107.7	108.8	115.4	113.1	106.5	106.5	105.0	106.4	106.1	98.7	113.5	101.6	108.0
1986	109.6		108.0	110.9	115.8	121.9	119.4	107.9	104.1	105.9	102.3	110.6	77.1	122.0	88.2	112.7
1987	113.6		113.5	114.2	121.3	128.1	124.8	111.8	111.0	110.6	105.4	114.6	80.2	130.1	88.6	117.0
1987: Aug	114.4	114.3	113.9	114.8	121.9	128.9	125.4	112.0	110.6	110.3	106.7	115.0	83.8	131.3	90.2	117.6
Sept	115.0	114.6	114.5	115.0	122.2	128.8	125.9	112.7	111.3	111.3	108.8	115.2	83.2	131.9	90.8	117.9
Oct	115.3	115.0	114.7	115.3	122.8	128.6	126.0	113.2	111.0	112.7	107.2	115.5	83.0	132.4	90.3	118.5
Nov	115.4	115.1	114.8	115.5	123.1	128.8	125.2	113.5	111.4	113.1	107.7	115.7	83.0	133.0	90.6	118.9
Dec	115.4	115.5	115.3	115.9	123.8	129.5	125.0	113.5	109.3	112.2	107.4	115.7	81.6	133.5	88.9	118.9
1988: Jan	115.7	115.9	115.6	116.4	124.5	130.9	128.4	114.7	109.2	112.3	107.3	115.5	80.4	134.6	88.3	119.5
Feb	116.0	116.1	115.3	116.8	125.1	131.5	129.0	114.8	109.7	112.0	107.1	115.8	78.9	135.4	87.8	119.8
Mar	116.5	116.7	115.7	117.2	125.7	133.0	129.3	115.3	109.5	114.2	107.2	116.2	79.2	136.0	87.8	120.4
Apr	117.1	117.2	116.5	117.5	125.8	132.6	129.6	115.7	109.9	116.5	107.5	116.2	80.1	136.8	88.5	121.1
May	117.5	117.6	117.0	117.8	126.2	132.8	130.0	114.4	109.9	116.5	109.2	116.4	81.5	137.7	88.9	121.5
June	118.0	118.0	117.7	118.2	126.7	133.3	130.0	114.7	109.0	116.1	108.4	116.6	80.8	138.3	88.7	121.8
July	118.5	118.5	118.9	118.6	127.2	133.8	131.2	114.5	109.0	115.4	108.8	116.6	81.3	139.1	89.0	122.2
Aug	119.0	119.0	119.6	118.9	127.9	134.4	131.8	115.0	109.8	113.5	109.8	116.9	83.6	139.9	90.8	122.4

[1] Includes items not shown separately.
[2] Household fuels and gasoline; fuel oil, coal, and bottled gas also included through 1982.
[3] Relative importance, December 1987.

Editor's Note:

In mid-August, the Bureau of Business and Economic Research forwarded copies of Exhibit 1, "Per Capita Personal Income Data for Arkansas Counties and Metropolitan Statistical Areas" to Arkansas' daily and weekly newspapers. This information was adapted from the Bureau of Economic Analysis, U.S. Department of Commerce, midyear 1988 release of information on the sources of Total Personal Income for the period 1969 - 1986.

Exhibit 1 presented a summarization of per capita income by county, by amount, and by rank among counties (highest = 1, lowest = 75) for the years 1980 and 1986. The summary also listed population, total personal income, percentage change in per capita income 1980 - 86, and percentage change in population 1980 - 86.

How, or if, the newspapers used the data is not known except for, at least, two newspapers which further condensed the data to show the ten highest and ten lowest counties in the ranking. Accordingly, some *Review* readers may find the data informative, even useful, in their professional lives. Thus, it is again disseminated here.

While there is no known research underway to determine the precise causes for the changes in ranking in per capita income, a quick look at unemployment rates and, therefore, employment rates too, for the 1980 - 86 period elicits no obvious correlations. Even so, the data quickly provides comparisons such as the counties with the lowest and highest percentage changes in per capita income: Prairie at 23.1 percent and Scott at 77.3 percent, respectively; or the counties undergoing the lowest and highest changes in population: Woodruff at -6.2 percent and Faulkner at 14.3 percent, respectively.

If you have questions on the data, please write:

Bureau of Business and Economic Research
College of Business Administration
University of Arkansas
Fayetteville, AR 72701

Exhibit 1

PER CAPITA PERSONAL INCOME DATA FOR ARKANSAS COUNTIES
AND METROPOLITAN STATISTICAL AREAS

County	1980 Population Estimate (1,000s)	1980 Total Personal Income (1,000s)	1980 Per Capita Personal Income Amount	1980 Per Capita Personal Income Rank	1986 Population Estimate (1,000s)	1986 Total Personal Income (1,000s)	1986 Per Capita Personal Income Amount	1986 Per Capita Personal Income Rank	Percentage Change in Per Capita Income 1980-1986	Percentage Change in Population 1980-1986
ARKANSAS	2,290.1	17,096,574	7,465	N/A	2,372.2	26,194,430	11,042	N/A	47.9	3.6
Arkansas	24.2	203,603	8,412	6	23.1	264,474	11,462	11	36.3	-4.5
Ashley	26.6	193,844	7,351	17	26.2	276,392	10,544	25	43.4	-1.5
Baxter	27.5	217,108	7,897	9	30.3	372,099	12,268	6	55.4	10.2
Benton	78.5	639,773	8,155	7	89.0	1,145,925	12,883	2	58.0	13.4
Boone	26.1	194,929	7,459	15	27.9	304,302	10,891	18	46.0	6.9
Bradley	13.8	94,707	6,866	29	13.2	131,907	9,999	39	45.6	-4.3
Calhoun	6.1	35,569	5,853	63	6.1	47,564	7,799	68	33.2	0.0
Carroll	16.2	111,107	6,840	30	18.1	209,629	11,579	10	69.3	11.7
Chicot	17.8	93,157	5,227	71	17.2	121,753	7,064	74	35.1	-3.4
Clark	23.3	170,542	7,314	18	22.7	235,042	10,373	30	41.8	-2.6
Clay	20.6	127,951	6,223	56	19.4	179,287	9,257	51	48.8	-5.8
Cleburne	16.9	111,750	6,594	41	19.3	196,728	10,181	34	54.4	14.2
Cleveland	7.9	53,281	6,746	36	8.3	84,778	10,214	32	51.4	5.1
Columbia	26.7	202,078	7,570	12	26.9	307,101	11,420	13	50.9	0.7
Conway	19.5	138,130	7,095	24	19.2	212,857	11,064	15	55.9	-1.5
Craighead	63.2	472,710	7,474	14	63.4	711,636	11,228	14	50.2	0.3
Crawford	37.0	243,481	6,578	44	41.9	391,813	9,357	49	42.2	13.2
Crittenden	49.5	334,704	6,757	35	50.4	451,621	8,966	57	32.7	1.8
Cross	20.5	135,004	6,592	42	20.4	186,847	9,161	53	39.0	-0.5
Dallas	10.5	74,774	7,101	23	10.4	105,137	10,093	36	42.1	-1.0
Desha	19.8	125,232	6,338	51	19.4	163,360	8,424	63	32.9	-2.0
Drew	17.9	122,058	6,804	32	18.0	162,881	9,066	55	33.2	0.6
Faulkner	46.3	362,012	7,814	10	52.9	638,278	11,932	7	52.7	14.3
Franklin	14.7	95,170	6,479	47	15.7	156,097	9,953	41	53.6	6.8
Fulton	10.0	56,385	5,649	69	10.3	82,055	7,973	67	41.1	3.0
Garland	70.6	600,474	8,500	4	75.3	931,678	12,377	5	45.6	6.7
Grant	13.0	101,094	7,761	11	13.5	148,644	10,984	16	41.5	3.8
Greene	30.8	202,609	6,589	43	31.7	297,814	9,401	47	42.7	2.9
Hempstead	23.6	145,891	6,175	58	23.0	737,281	10,304	31	66.9	-2.5
Hot Spring	16.8	192,809	7,188	22	27.4	254,659	9,308	50	29.5	2.2
Howard	13.5	98,296	7,303	19	13.5	159,513	11,838	8	62.1	0.0
Independence	30.3	217,009	6,996	28	32.3	337,477	10,450	29	49.4	6.6
Izard	10.8	72,756	6,745	37	11.0	116,792	10,644	22	57.8	1.9
Jackson	21.6	144,165	6,663	38	20.7	195,217	9,410	46	41.2	-4.2
Jefferson	90.8	685,071	7,543	13	90.0	947,443	10,529	26	39.6	-0.9
Johnson	17.5	111,216	6,356	49	18.6	180,836	9,746	44	53.3	6.3
Lafayette	10.2	72,236	7,085	25	9.8	106,285	10,874	19	53.5	-3.9
Lawrence	18.5	126,108	6,823	31	18.1	175,174	9,661	45	41.6	-2.2
Lee	15.6	73,777	4,734	75	15.0	94,295	6,287	75	32.8	-3.8
Lincoln	13.4	69,586	5,197	72	13.2	96,336	7,299	73	40.4	-1.5
Little River	14.0	95,045	6,798	33	14.1	142,174	10,063	37	48.0	0.7
Logan	20.2	133,914	6,639	39	20.9	217,749	10,169	35	53.2	3.5
Lonoke	34.6	278,733	8,053	8	38.4	405,454	10,582	23	31.4	11.0
Madison	11.4	71,036	6,245	52	11.9	125,134	10,491	28	68.0	4.4

PER CAPITA PERSONAL INCOME DATA FOR ARKANSAS COUNTIES
AND METROPOLITAN STATISTICAL AREAS

County	Population Estimate 1980 (1,000s)	1980 Total Personal Income ($1,000s)	1980 Per Capita Personal Income Amount	1980 Per Capita Personal Income Rank	Population Estimate 1986 (1,000s)	1986 Total Personal Income ($1,000s)	1986 Per Capita Personal Income Amount	1986 Per Capita Personal Income Rank	Percentage Change in Per Capita Income 1980-1986	Percentage Change in Population 1980-1986
Marion	11.4	70,790	6,213	57	12.6	115,565	9,165	57	47.5	10.5
Miller	37.9	281,479	7,431	16	38.9	424,971	10,918	17	46.9	2.6
Mississippi	58.4	377,026	6,344	50	58.0	531,538	9,159	54	44.4	-2.4
Monroe	14.0	82,919	5,911	62	12.9	100,737	7,798	69	31.9	-7.9
Montgomery	7.7	44,247	5,713	67	7.9	77,982	9,846	42	72.3	2.6
Nevada	11.1	71,936	6,477	48	10.8	108,294	10,014	38	54.6	-2.7
Newton	7.8	39,179	5,052	73	8.2	62,806	7,637	70	51.2	5.1
Ouachita	30.6	221,567	7,229	20	33.8	336,958	9,973	40	38.0	10.5
Perry	7.3	42,037	5,761	66	7.9	69,033	8,788	60	52.5	8.2
Phillips	34.7	201,197	5,791	65	33.1	248,871	7,527	71	30.0	-4.6
Pike	10.4	68,048	6,571	45	10.0	98,566	9,814	43	49.4	-3.8
Poinsett	27.0	178,753	6,626	40	26.0	233,604	8,969	56	35.4	-3.7
Polk	17.1	106,500	6,239	54	17.1	173,921	10,182	33	63.2	0.0
Pope	39.2	274,275	6,996	27	43.4	471,546	10,855	20	55.2	10.7
Prairie	10.1	68,580	6,759	34	10.1	84,097	8,317	64	23.1	0.0
Pulaski	341.2	3,243,851	9,506	1	356.3	5,092,573	14,292	1	50.3	4.4
Randolph	16.8	98,130	5,841	64	16.7	141,913	8,491	62	45.4	-0.6
St. Francis	30.9	185,735	6,010	60	31.5	257,327	8,163	66	35.8	1.9
Saline	53.3	448,594	8,413	5	58.0	663,048	11,432	12	35.9	8.8
Scott	9.7	57,843	5,949	61	10.3	108,642	10,549	24	77.3	6.2
Searcy	8.8	46,286	5,240	70	8.9	66,342	7,483	72	42.8	1.1
Sebastian	95.4	830,607	8,708	2	99.2	1,275,164	12,852	3	47.6	4.0
Sevier	14.1	99,407	7,062	26	14.2	151,274	10,678	21	51.2	0.7
Sharp	14.7	91,567	6,241	53	15.5	136,131	8,764	61	40.4	5.4
Stone	9.1	45,012	4,961	74	10.0	83,278	8,288	65	67.1	9.9
Union	48.6	422,947	8,700	3	49.0	617,432	12,590	4	44.7	0.8
Van Buren	13.4	76,434	5,704	68	15.0	134,063	8,924	58	56.5	11.9
Washington	100.6	727,153	7,225	21	107.4	1,254,128	11,682	9	61.7	6.8
White	51.0	317,742	6,232	55	53.2	498,340	9,373	48	50.4	4.3
Woodruff	11.2	67,420	6,019	59	10.5	92,568	8,853	59	47.1	-6.2
Yell	17.1	111,479	6,538	46	17.7	186,330	10,505	27	60.7	3.5
1980 Metropolitan Statistical Areas*					1986 Metropolitan Statistical Areas*					
Fayetteville-Springdale	100.6	727,200	7,225	6	107.4	1,254,000	11,682	4	61.7	6.8
Ft. Smith, AR-OK	163.3	1,265,900	7,753	4	176.0	1,961,000	11,145	5	43.8	7.8
Little Rock-N. Little Rock	475.5	4,333,200	9,113	1	505.6	6,793,000	13,435	1	47.4	6.3
Memphis, AR-TN-MS	915.9	8,327,800	9,092	2	959.5	12,838,000	13,380	2	47.2	4.8
Pine Bluff	90.8	685,100	7,543	5	90.0	947,000	10,529	6	39.6	-0.9
Texarkana, AR-TX	113.4	930,500	8,207	3	119.4	1,428,000	11,915	3	45.2	5.3

* Personal Income Figures May Differ from Single County Amounts Because of Rounding.

Source - Adapted by the Bureau of Business and Economic Research, U of A Fayetteville, from:
U.S. Dept. of Comm., BEA, REMD(BE-55), Table CA5, Personal Income and Employment 1969-1986, Washington D.C.

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The Interaction Effects of Women in Groups: A Review of the Literature and Implications

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Introduction

The subject of occupational rate differences and influences between sexes continues to be of interest in both theory and research. As the roles of men and women become increasingly entangled, especially in the work place, more and more importance will be placed on a greater understanding of the roles of the sexes. Thus, research studies concerned with the differences and similarities between the sexes are increasing in the literature. The influence of the female upon the male role, and vice versa, is offering interesting observations and implications for organizational behaviorists. However, sex bias, both male and female, will always exist to some extent.

Nevertheless, it is not unusual to observe many women succeeding in several non-traditional work environments, such as accounting and managerial occupations. Heightened exposure to prosperous and achieving women is frequently viewed as the answer to the difficulty of sex bias in occupational roles. It may be that as females become known as being capable of managing traditional male occupations, the occurrence of sex bias in personnel decisions will diminish. Those who believe this viewpoint expect the difficulty of sex discrimination to decline as a direct result of logically occurring transformations.[1]

Once occupational stereotyping is secured, it tends to maintain itself over time and appears to be difficult to change. The recent accentuation on equal opportunity in the workplace has lessened the inhibitions concerning professional women, especially in male-dominated occupations. Awareness techniques and pressure groups have served to promote the integration of professional women. Further, it is anticipated that women will persist in increasing numbers to enter the workforce. It is also anticipated that women will continue to be perceived as occupying a higher status as they persevere in obtaining professional occupations.[2]

This paper was written primarily to call attention to the problems associated with human perceptions (or misperceptions if one prefers that term). The underlying theme or backdrop for this paper is that the differences between the sexes as managers are essentially fictional rather than real. That is, the idea proposed here is that women, once given the opportunity, are just as effective as men in the workplace.

The supposition that women are not as effective managers as men is grounded more in the perceptions of the various participants than in the reality of the workplace.

Purpose

As females are promoted into managerial positions they typically become a member of the male dominated hierarchy. Naturally, this type of drastic change is going to have an impact on the way the members perceive themselves and each other. Eventually this entrance of women into the group will affect how the group conducts its affairs. This paper is especially interested in the change that takes place as women move into managerial positions. Unlike other approaches to the subject that concentrate solely on the role of the female, this paper is also interested in the group and the female's impact upon the group.

The purpose of this paper encompasses three broad categories. First, the paper will examine how women affect and influence group behavior. Second, the paper will examine how women are affected by being members of a mixed or male-dominated group. Finally, the third purpose of this paper is to examine the existing perceptions of both sexes concerning women in the workplace and the changes in these perceptions over the past 20 years. The contention here is that women can be just as effective in the workplace as men and the differences between the sexes as managers is more an illusion of perception rather than a reality. This paper reviews recent (since 1970) research conducted in areas relating to the dynamics of mixed-gender and male-dominated groups, derives conclusions based on that review, and develops implications for women in management. First, however, a theoretical framework is presented on which much of the research since 1970 has been based.

Theoretical Framework

Business and society in general appear to readily accept stereotypic attitudes and to struggle against the full integration of females into male-dominated occupations. Many perceive that there exists a stock of stereotypical traits that are assumed to be fundamental for executive success, and women often are seen as lacking these characteristics.[3] Thus, stereotyping of minority individuals is a common occurrence and an important influential factor on perceptions and interactions.[4] However, it has been documented that women do possess the qualifications necessary to be effective managers.[5]

Terborg and Ilgen contend that the role of stereotypes, as well as Attribution Theory and Equity Theory, contributes to the treatment of women in mixed groups. The attribution model asserts that job related conduct may be attributed to association with such factors as chance, effort, capability, and assignment difficulty. The model defines variable factors as being unstable and able to vacillate over time. These elements are viewed as a prime root of change, as example being attributing superior performance to luck.[6] Thus, managers do not generally perceive females as endowed with the necessary skills to be decisive or to be assertive, two traits ordinarily possessed by successful business executives. Many perceive male occupations as unsuitable for females. Furthermore, females are perceived as being

uninterested in many of these traditionally male-dominated occupations. Consequently, in the event that a female performs adequately in a male situation, a male manager will attribute the performance to variable factors such as luck. These notions enable the male manager to maintain a consistent perception of his female co-workers.[7]

Equity Theory provides another theoretical framework for investigating mixed group behavior. The theory hypothesizes that individuals compare the ratio of their inputs, such as expenditure of time and effort, to their outcomes, such as salary or recognition, with that of a "comparable person". Equity occurs when the individual perceives that his or her ratio is equal to the ratio of his/her comparison person. When the comparison ratio is not equal, inequity is said to occur.[8]

Terborg and Ilgen offer several implications of equity theory for women pursuing management careers. Many men possessing sources of power within the organization may hold stereotypic attitudes toward women. Consequently, it is likely that these men will not perceive women as possessing equivalent levels of inputs as men in traditionally male-dominated occupations. Most likely females will be compared to male co-workers. Therefore, the women are perceived as deficient in various qualities including organizational commitment, business competency, and occupational involvement. Hence, a male manager may perceive a female's inputs as inferior to that of a male co-worker when he is allocating outcomes such as salary increases and advancements. The manager will then distribute fewer outcomes to the female in order to sustain equity within the organization.[9]

Kanter defines a token individual as one who assumes a minority position within the group. It is contended that certain perceptions of the token individual are formed by the majority members in a group with a disproportionate distribution. These perceptions are the causes of the group dynamics between the tokens and the majority members. This phenomena explains the formation of pressures that the majority members impose on the minority individuals. Kanter contends that in response, there are common token reactions to these pressures.[10]

Kanter has identified three perceptual properties affiliated with token individuals as the basis for her investigation. These phenomena include visibility, polarization, and assimilation.[11] Tokens experience heightened visibility because of their distinct peculiarness.[12] Visibility is increased because of the token's uniqueness in the environment.[13] As the total membership of the token group increases the high visibility declines.[14]

The second perceptual phenomenon, polarization, occurs when the token individual is perceived as possessing a different store of social traits than the dominant group. The majority members become distinctly more aware of similarities and dissimilarities. The inadequate numbers of tokens perpetuates this predisposition and leads to further isolation by the dominant group members.[15]

The third perceptual tendency, termed assimilation, entails the use of stereotypes and generalizations concerning the individual's social type. Distorted characteristics of the token are solicited in an attempt to conform to the generalizations. Tokens that are increasing in numerical proportions may serve to allow discrepan-

cies in noted generalizations. It is possible for these generalizations to change and adapt to the inconsistencies. However, it becomes more feasible for majority members to maintain existing generalizations and stereotypes and thus misconstrue the awareness of the token if the minority individuals continue to constitute a small proportion of the total group.[16]

Hollander contends that the acquisition of leadership status is determined by the expectations of perceivers as well as by the individual's behavior. He further asserts that leadership mandates a socially conditioned expectancy. That expectancy for women do not match that for leadership. The qualities of leadership, assertiveness and dominance, are congruent with the male role stereotype. Thus, if women are not perceived as being leaders, their likelihood of becoming leaders is decreased.[17]

The male stereotype is generally thought to encompass those individuals with the greatest capacity for leadership. However, the theory of androgyny states that an individual may possess both masculine and feminine characteristics. Bem contends that because his or her self-concept includes both masculine and feminine traits, the androgynous individual is able to adapt to changing conditions of various situations. The androgynous individual displays whatever behavior is deemed appropriate at the time, despite traditional stereotypic beliefs.[18]

Review of Literature

Table 1 summarizes research since 1970 on the interaction effects of women in groups. There are 18 studies utilizing several types of methods. Dependent variables include salience of group membership, effectiveness, performance pressure, boundary heightening, role entrapment, self-concept, motivation, social contact, personality traits, attitudes, discrimination, and job satisfaction. The studies consist of ten laboratory experiments, seven field studies, and one case study. The following discussion concerns itself with the analysis of the research presented in Table 1.

One of the concerns of researchers is that female tokenism is pervasive in male-dominated group settings. Kanter contends that stereotypes are much more pervasive when there is inadequate information on which to evaluate the minority individual.[19] In an attempt to empirically investigate Kanter's hypothesis, Spangler et al. utilized an academic setting and tested the contention by comparing the performance of women students at a law school where women were a minority, with that of women at a school where they constituted a larger proportion of the student population. The study revealed that the women in the setting with fewer female students performed at a lower level academically, experienced social isolation, and exhibited a tendency to display traditional female attitudes in study tactics and employment options.[20] Likewise, in the majority of the cases studied by Wolman and Frank, the token woman assumed a deviant role which caused her to become dissatisfied. The solo women were prohibited from contending for status and power upon group interaction. It was frequently observed that assertive behavior exhibited by a woman was disregarded by other group members.[21]

Kanter and Spangler et al. contend that balanced groups provide a lesser degree of

Table 1

A Survey of the Literature since 1970: Interaction Effects of Women in Groups

Study	Method	Sample Size	Population	Dependent Variable	Measure	Findings
Shomer & Centers (1970)	Laboratory experiment	214	Undergraduates in an introductory psychology course	Salience of group membership	Questionnaire	Men's attitudes toward women reformed drastically as the number of women in the group increased.
Wolman & Frank (1975)	Case Study	18	6 peer groups of psychiatric residents each containing one woman	Roles assigned by the group	Bales group space system, and methods by Dalton	The solo woman occupied a deviant role which caused dissatisfaction.
Eskilson & Wiley (1976)	Laboratory experiment	144	White male and female undergraduates	Effectiveness	Bales Interaction Analysis	Female leaders performed least effectively when leading males.
Kanter (1977)	Field study	127	Sales force of a large industrial corporation	Performance pressure, boundary heightening, role entrapment.	Interview	Solo experienced heightened visibility, increased performance pressure, exaggeration of attributes, and stereotypical assumptions.
McGuire & Padawer-Singer (1978)	Laboratory experiment	252	Sixth grade students	Self-concept	Questionnaire and self-description	Distinctiveness of solo draws attention of other group members. The solo more often mentioned sex in self-descriptions.

sex stereotyping and role entrapment.[22] In balanced groups, females become increasingly less conspicuous as a separate group. Hence, males are less inclined to accentuate the boundary between themselves and females.[23] Balanced groups provide women with a greater ability to overcome generalization endeavors which accentuate the dissimilarities between males and females in the group.[24] However, Izraeli's study found that women were more reactionary to fluctuations in the sex composition of the group than men. Furthermore, Izraeli's study asserts that the change precluded by boundary heightening and role entrapment transpired much more frequently in women than in men.[25] As Table 1 indicates, these three studies are in agreement that those individuals who choose "inappropriate" roles in employment, often, will experience the consequences of feeling isolated and peculiar. Furthermore, they are faced with the difficulty of demonstrating that their femininity or masculinity and their occupational ability are not to be doubted despite the nontraditional occupation that they have chosen.[26]

Another concern of many researchers is the effect of group dynamics on self-perceptions. As Table 1 indicates, several studies have documented that when individuals are in a social predicament that mandates their category membership as unique, that category affiliation becomes a significant factor of each individual's self-perception. Furthermore, an analysis of the individual's self-descriptions in several studies revealed that category membership was most often mentioned.[27] The distinctiveness of the solo group member further draws the focus of other group members to the token individual.[28] Attention is further drawn to the solo status, and the distorted consciousness of the token tends to emphasize the peculiar category membership.[29] Furthermore, it was found that male individuals were thought to be masculine when they occupied solo status, while females were perceived to be less feminine when they possessed solo status.[30]

Numerous researchers have addressed the issue of whether females in male-dominated occupations acquire masculine characteristics. As evidenced in Table 1, several researchers[31] have asserted that those women entering male-dominated professions are likely to possess both the feminine and expressive qualities as well as the masculine and instrumental attributes frequently associated with achievement. Maupin's study concluded that the majority of women reaching the partnership level in public accounting firms possess androgynous behavior traits. Further, the study indicated that women who experience a decreased level of job satisfaction most likely exhibit stereotypic behavior.[32] Another study found that women in the accounting field exhibited significantly lower needs for order, affiliation, and nurturance than adult women in general.[33] It appears that differences among male and female accountants tend to diminish over time. The implication is that women are being changed by the occupational socialization of the society.[34]

In contrast, Hans and Eisenberg theorize that those who are in the minority will conform to those individuals in the majority in their role-related behavior. Because men are stereotypically seen as leaders, or decisive members in the group, the anticipation of participation in the group may increase the awareness of masculine attributes rather than feminine

characteristics. The research suggests that the consciousness of sex-role characteristics is not only linked to the distinctiveness of the individual's sex in a group but also to the sex-role dimensions of the group task.[35]

It appears from the literature that the pro-male bias does exist and presently it is difficult for females in male-dominated occupations to overcome certain obstacles.[36] The responses to a survey conducted by Sutton and Moore revealed that the attitudes toward women in the business world continue to be controversial. It was noted that several obstacles still hinder female managers from achieving in business occupations. However, the data suggest that there is an increasing tendency for men to feel comfortable working for women.[37]

Research also reveals that many male executives support the contention that females want to achieve and should be given the opportunity to succeed.[38] However, it appears that the majority of men and women still perceive that a woman must be outstanding in order to succeed in the business environment.[39] Pazy asserts that the cause for the persistence of the pro-male bias in society is due to the inadequate information concerning women's work and abilities. Women's work is frequently perceived as inadequate because many believe that it is the product of luck or environmental factors. Pazy hypothesizes that if appraisers of performance are educated about determinants of performance, then evaluation and conduct toward women will be similar to that of men.[40]

Several researchers have investigated the phenomenon of the change in sex composition and its effects on leader behavior and member motivation. As indicated by Table 1, Eskilson and Wiley[41] discovered that women leaders were least effective when the group was composed of men only, and that male leaders experienced difficulties when the group composition consisted of one male and one female. The study suggested that the reason for the difficulty of women leading men may be related to "sex-role awareness." In these group settings, women appear to recess into stereotypic patterns, thus signaling to the men that they should assume dominant roles. Craig and Sherif contend, however, that as the number of women in the group increases, the degree of stereotyping decreases, the perceptions toward women are enhanced, and the attention to women's ideas increase.[42]

Despite the negative implications of women in male-dominated situations, it has been documented that both sexes are better motivated in mixed-sex groups.[43] The results of Kerr and MacCoun's study[44] supported an "esteem maintenance model" which asserts that both sexes place greater emphasis on demonstrating capabilities to opposite-sex-group members than to same-sex members. This model advocates the contention that both males and females persist in mixed-sex dyads more than they would if working separate from the group.

Finally, another concern of many researchers is the effect of women's labor force participation on both sexes' work experience. South, et al. investigated the premise that with an increased proportion of females, the lower social cohesiveness among male employees is lessened and there is more social endorsement for males from female workers. The study revealed support of the hypothesis, and it was found that in groups with a large proportion of

females, males will have less contact with, and therefore receive less social endorsement from male workers.[45] Shomer and Centers conducted another significant study which also revealed that men's attitudes toward women reform drastically as the number of women in the group increased. However, the researchers suggested that a woman in a power position may experience difficulty in convincing other members of her worth to the group.[46] Craig and Sherif documented that as the number of women in the group increases, the attitudes toward women improve, the sex-role differences appear to be minimized.[47]

Conclusions and Implications

From a review of the literature since 1970, on the interaction effects of women in groups, several conclusions emerge. First, those women in male-dominated group settings possess lower satisfaction and exhibit a lower performance level. Solo women tend to have less interaction with group members. By possessing solo status, the token woman draws attention to herself and is perceived as being less feminine. Leader behavior appears to be affected by being a solo leader, that is, women appear to exhibit stereotypic behavior when leading males. Finally, many women entering male-dominated occupations appear to possess androgynous characteristics.

Various conclusions may also be drawn from the studies conducted on women in balanced male-female groups. There appears to be less stereotyping in balanced groups. Furthermore, there appears to be more freedom for group members to assume nontraditional roles. Femininity and masculinity are not open to question. In balanced groups, token women become less noticeable as a distinct minority group. In addition, there appears to be more motivation with opposite sexes in balanced groups. These settings enable the attitudes toward women to improve. As the number of women in the group increases, men become less likely to form cohesive groups, and thus, women receive more social endorsement. And, finally, sex-role differences appear to be minimized in balanced groups.

Additional conclusions may be made concerning females and society. Females in male-dominated professions are possessing more masculine traits. Also, much of the research indicates that females must be exceptional in order to succeed. It has also been reported that the pro-male bias still exists to some degree and that certain obstacles are still a hindrance to managerial success. The literature continues to document the difficulty of women entering male-dominated professions. Recent studies have investigated the behavioral impact of women in groups. Heightened motivation of both sexes and increased social support for women are among the many findings endorsing the contention that women exhibit behavioral influences on groups. In short, women have been found to significantly influence group dynamics, essentially in a positive direction.

The theme of this paper was to expose some of the problems associated with women in management. Specifically, the problems are more perceptual in nature than grounded in the reality of the workplace. Indeed, the literature seems to support the contention that once given the opportunity, women in mixed groups bring

more assets to the group than liabilities. As a practical matter, as more women enter the organizational hierarchy, more information is available upon which to make decisions about their performance. Thus, as men and women get to know each other better the women are perceived (both by themselves and others) as capable of performing in a managerial role. Sex-role differences are not perceived as important.

Because of the behavioral impact of women in groups, the increasing number of women in executive positions may change the way companies are managed. Not only are women initiating changes, but other interested parties supporting the advancement of women are contributing to the transformation of today's business world. Perhaps possible assistance could be found in organizational programs which focus on decreasing discrimination within the workplace. The benefits from this action are twofold. First, because this behavior would ease the obstacles that many women encounter within the workplace, professional women would perhaps become further committed to the organization. And, second, a broader analysis of the situation reveals that this action would enhance organizational effectiveness by decreasing the tension within the workplace.

The results reported in these studies are very interesting as well as encouraging. It appears that once a balance in group membership has been achieved several positive outcomes take place. Not only do the attitudes toward women improve but the attitudes toward men improve as well. Women feel better about themselves and their role in the group's activity. The same appears to hold true for men. Hopefully, this heightened level of personal and job satisfaction will lead to an increase in the group's output and efficiency. More research obviously needs to be conducted in the area of sex composition and group productivity.

It appears that management needs to take a look at the way their organizations are structured. An equitable balance of women and men in the hierarchy brings about many more benefits to the organization than costs. Special projects as well as committees should also be more evenly balanced between female and male participants. Increased motivation, higher productivity, and less conflict are just some of the benefits accorded to balanced groups. It is true that the role differences between the sexes are many. But it is probably these differences that add a certain amount of variety in the group composition, thus improving group performance.

Other implications appear somewhat obvious. For example, the progressive organization needs to make it clear that women are going to be utilized and promoted. Not only should competent women be given leadership positions but they should be given the power necessary to perform the job. In short, the organizations must not just give "lip service" to women but should be willing to stand behind the decision to utilize women through rewards, career development, etc.

The men of the organization should not be forgotten. They have just as much expertise to bring to the job as women. One of the more interesting ways to utilize the talents of each is to set up several co-leadership groups. Each group would be led equally by a man-woman team, used together to complement each other. For example, one may be a task-oriented

leader, the other a relationship-oriented leader, both together providing the necessary ingredients for successful leadership.

Once the decision has been made to actively utilize women throughout the organization a male backlash will probably occur. It is important not to hide these feelings as they are only natural. Perhaps a partial remedy would be small discussion groups of men and women, meeting both separately and together. Feelings of frustrations and anger can be openly discussed. Competent discussion leaders could help identify behavioral problems and help the participants work toward a solution that would be equally beneficial to both men and women.

One of the conclusions of the research presented here was that women must be outstanding in order to succeed in a man's world. What this means to the organization is that the standards of performance should not be higher for women than they are for men. Women are human; they are going to make mistakes; they are going to fail from time to time. But if a woman succeeds or fails the organization should make sure that the same yardstick of performance is being used for both sexes. The literature suggests that when adequate information is available upon which to judge women, the stereotypes tend to fall away.

There are also many implications in society as a whole in having a balanced approach to management. The perception of females as useful contributors to society will be strengthened. As women become equals in the working relationship it will have a spill-over effect into the home, politics, the school, church, etc. In effect, women will become less of a wasted resource and more of a useful one to society. As more females move into traditionally male occupations, and vice versa, there will be more cooperation between the sexes, not less. There will be more productivity, not less. There will be more respect, not less. In short, society can do nothing but improve in the long run by optimizing one of its most valuable resources - women.

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Table 1 (Cont.)

Study	Method	Sample Size	Population	Dependent Variable	Measure	Findings
Spangler et al. (1978)	Field study	1370	Randomly selected samples of law students at seven law schools.	1) Performance pressure 2) Social isolation 3) Role entrapment	Questionnaire	Performance Pressure hinders women's achievement when they are tokens.
Izraeli (1983)	Field study	128	Self-selection of women in male-dominated Israeli firms	Boundary heightening, role entrapment, and influence	Questionnaire	Boundary heightening, role entrapment and asymmetrical power relationships are more apparent in skewed groups.
Kerr & Sullaway (1983)	Laboratory experiment	170	Undergraduate students	Group member task motivation	Simple motor task/ Multifactor design/ ANOVA	Both males and females were better motivated in mixed-sex dyads than individually.
South, et. al. (1983)	Field study	387	Male federal employees	1) Males' frequency of contact with male coworkers 2) Frequency of contact with female coworkers 3) Amount of social support males received from males 4) Amount received from females	Questionnaire	The higher the proportional representation of females, the lower social solidarity among male workers and the greater the social support for males from female coworkers.

Table 1 (Cont.)

Study	Method	Sample Size	Population	Dependent Variable	Measure	Findings
Crocker & McGraw (1984)	Laboratory experiment	156	White male and female undergraduates	Effectiveness, satisfaction with supervision	Group ranking and questionnaire	Solo females were less likely to be identified as the group leader. Group members more satisfied with group composition when solo male present.
Kerr & MacCoun (1984)	Laboratory experiment	122	Undergraduate students	Effect of group member relative task ability	7-point bipolar scale on post-experimental questionnaire	Both sexes worked significantly harder when in mixed-sex groups.
Hans & Eisenberg (1985)	Laboratory experiment	72	Undergraduates in an introductory psychology class	Self-perceptions	Personal Attributes Questionnaire (PAQ)	Mixed-sex discussion groups caused shifts in their self-description along masculine dimensions.
Kotts et al. (1985)	Field study	50	Female accountants	Change in demographic and personality variables	Edwards Personal Preference Schedule (EPPS)	Female accountants exhibited significantly lower scores on the need for Deference, Order, Affiliation, Abasement, and Nurturance and significantly higher on task oriented needs.

Table 1 (Cont.)

Study	Method	Sample Size	Population	Dependent Variable	Measure	Findings
Sutton & Moore (1985)	Field study	786	Randomly selected male and female executives from large corporations	Attitudes	Survey (5-page questionnaire duplicated from a 1965 survey)	Greater acceptance of women in executive positions, certain obstacles still hinder female managers. Women's opinions about their status are more negative than men's.
Craig & Sherif (1986)	Laboratory experiment	120	Undergraduates in an introductory psychology course	Effectiveness	Bales Interaction Analysis	Opposite sex characteristics in self descriptions are more likely when there is token status.
Heilman & Martell (1986)	Laboratory simulation	147	Undergraduate students	Sex discrimination in the applicant screening process	4 9-point bipolar adjective scales scales	Only under specific conditions would exposure to successful women in male-dominated occupations deter sex discrimination in applicant screening decisions.
Pazy (1986)	Laboratory simulation	48	Middle-level managers from commercial government, and non-profit organizations	1) Expectation of high performance 2) Appropriateness of pay raise 3) Appropriateness of promotion	8 9-point dimensions	There was persistence of the pro-male bias in all three dependent measures.

Table 1 (Cont.)

Study	Method	Sample Size	Population	Dependent Variable	Measure	Findings
Maupin (1986)	Field study	343	Female accountants	Job satisfaction levels of female CPA's	Bem Sex-Role Inventory (BSRI) and JDI	Those women with equally high levels of both masculine and feminine characteristics achieved the greatest level of job satisfaction.

An Analysis of Metropolitan Retail Trade Centers in Arkansas

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Introduction

Decisions to locate new businesses, expand existing businesses, or close unprofitable operations often center around an assessment of a given market area's economic health. This economic health is reflected in and influenced by the area's retail trade flows.

Metropolitan retail trade centers normally benefit from an inflow of trade as consumers come from nearby areas to shop. This influx of consumer expenditures is known as inshopping and provides opportunities for businesses that can capitalize on the inflow of retail trade. Outshopping occurs when people leave a given trade area to buy elsewhere. All market areas experience inshopping and outshopping to some extent and the relative economic strength of a given retail trade area is affected by the net impact of this behavior.

The purpose of this article is to present an analysis of the net effect of the inshopping and outshopping behavior occurring in the metropolitan trade areas in Arkansas and to provide a measure of the various trade areas' economic health. Implications for the Arkansas business community are assessed. The sales conversion index (SCI) is the primary tool used in the analysis and is discussed next.

Methodology -- The Sales Conversion Index

The sales conversion index was developed by the authors and is a relatively simple analytical tool used to provide an indication of the economic health of a given retail trade area as compared to similar trade areas. Its usefulness is based on the fact that, in a given market area, people have a certain amount of personal income available for retail expenditures. The percentage of income that is converted into retail sales varies from one part of the country to another and depends on income and the level of such non-retail expenditures as housing, utilities, insurance, and local taxes. Areas that are similar in terms of income and non-retail expenditures, then, can be expected to have approximately the same ratio of retail sales to Effective Buying Income. (Effective Buying Income is defined as "personal income less personal taxes and non-tax payments."[1]) If a given market area has a high ratio of retail sales to its Effective

Buying Income, the area is benefiting from a net inflow of consumer dollars to a greater extent than the areas that provide a basis for comparison. A low ratio, on the other hand, indicates that the retail sector is less healthy and the area is probably receiving a smaller inflow of consumer dollars or could even be suffering from a net outflow.

The SCI utilizes a benchmark that is similar to the subject areas in terms of income and non-retail expenditures. This benchmark provides a basis of comparison by which the subject areas can be analyzed. The first step in developing the sales conversion index is to calculate conversion factors for both the subject areas and for the benchmark. Conversion factors are calculated by dividing retail sales by Effective Buying Income. The subject area's conversion factor is then divided by the benchmark's conversion factor. The resulting figure is the sales conversion index and provides a relative measure of a subject area's ability to convert income into retail sales. The conversion factor and the SCI can be expressed mathematically as shown in equation 1 and 2.

A sales conversion index that is significantly above 100 indicates the subject area is converting a relatively high proportion of income into retail sales and is probably benefitting from inshopping to a greater extent than the benchmark as a whole. A sales conversion index that is significantly below 100 indicates the subject area is converting a low proportion of income into retail sales and is either benefitting from inshopping to a lesser extent than the benchmark or suffering from outshopping to a greater extent. Additional insight into the nature of the inshopping and outshopping activity occurring in a given community can be gained by calculating a SCI for various store groups within a market area.

A major strength of the sales conversion index is that it enables the manager to focus on specific markets in relation to a benchmark that is similar in terms of income and non-retail expenditures. It also utilizes data that is readily available, is easy to calculate, and requires little financial expenditure on the part of the user. The April 1988 issue of the *Journal of Small Business Management* contains an in-depth discussion of the SCI and its usefulness as a market analysis tool in an article entitled "The Sales Conversion Index: A Technique for Analyzing Small Business Market Opportunities."

The SCI was used to analyze Arkansas' metropolitan retail trade centers. The trade centers selected for the analysis were those defined by the United States Office of Management and Budget as metropolitan statistical areas. Because metropolitan areas typically draw trade from the rural areas nearby, nonmetropolitan satellite counties that provide substantial

$$\text{Conversion Factor} = \frac{\text{total retail sales for the market area}}{\text{total Effective Buying Income for the market area}} \times 100 \qquad (1)$$

$$\text{Sales Conversion Index} = \frac{\text{market area's conversion factor}}{\text{benchmark area's conversion factor}} \times 100 \qquad (2)$$

amounts of trade to the metropolitan areas were also included in the analysis. Retail sales and income levels for Arkansas' metropolitan areas provided the appropriate benchmark for the metropolitan areas examined. Corresponding figures for Arkansas' nonmetropolitan areas provided the appropriate benchmark for the satellite counties. An analysis of the relative market strength of the retail sector of Arkansas' metropolitan areas is provided next.

Analysis of Arkansas' Metropolitan Retail Trade Centers

Metropolitan areas are usually considered retail trade centers because their highly developed retail facilities often attract shoppers from other areas. Arkansas has five metropolitan areas located throughout the state: Fayetteville/Springdale, Fort Smith, Little Rock/North Little Rock, Pine Bluff, and Texarkana. These five areas have a combined population of 938,700 which represents 39 percent of the total state population. These five areas, however, account for $5.7 billion or 48 percent of Arkansas' total retail sales and $10.2 billion or 44.6 percent of the state's effective buying income. An examination of each of Arkansas' metropolitan areas is presented next.

Fayetteville/Springdale Metropolitan Area

Table 1 shows sales conversion indexes for the Fayetteville/Springdale metropolitan area and surrounding satellite counties. The metropolitan area consists

Table 1
Sales Conversion Index for the Fayetteville/Springdale Metropolitan Area

	Total Retail Sales ($000)	÷	Effective Buying Income ($000)	=	Conversion Factor	Sales Conversion Index
Fayetteville/Springdale Metropolitan Area	649,750		1,080,976		60.1	108
Washington County	649,750		1,080,976		60.1	108
Fayetteville City	420,739		413,330		101.8	183
Springdale City	211,131		276,663		76.3	139
Suburban Total	17,880		390,983		4.6	8
Satellite Counties:						
Benton County	382,849		980,741		39.0	82
Madison County	31,467		89,180		35.3	74
Franklin County	41,771		149,344		28.0	59

Note: The benchmark conversion factor for the metropolitan areas (55.4) was derived from aggregate figures for all metropolitan areas in Arkansas. The benchmark conversion factor for the satellite counties (47.8) was derived from aggregate figures for all non-metropolitan counties in Arkansas.
Source: "1987 Survey of Buying Power," *Sales and Marketing Management,* 139 (July 27, 1987).

of Washington County which contains the cities of Fayetteville, Springdale, and the suburban area in Washington County. This metropolitan area is located in the northwest portion of Arkansas and has a total population of 107,100. Fayetteville is the home of the University of Arkansas with an enrollment of approximately 14,000 students.

The Fayetteville/Springdale metropolitan area has a SCI of 108. This indicates that, compared to the benchmark, the Fayetteville/Springdale market area is relatively healthy in terms of its ability to convert effective buying income into retail sales.

The city of Fayetteville appears to have the greatest retail strength with a SCI of 183. The inshopping behavior of the University of Arkansas' 14,000 students probably contributes substantially to this relatively high sales conversion index. The city of Springdale also appears economically healthy with a sales conversion index of 139. As would be expected, the suburban area outside the cities convert relatively little income into retail sales with a sales conversion index of 8.

It seems reasonable to believe that much of the inflow of retail trade into the Fayetteville/Springdale metropolitan area comes from the surrounding counties. Benton, Madison, and Franklin Counties have relatively low sales conversion indexes and, therefore, appear to be contributing substantially to the favorable trade flows.

Fort Smith Metropolitan Area

The Fort Smith metropolitan area borders Oklahoma in the west-central part of Arkansas and is the second largest metropolitan area in the state with a population of 180,000. As Table 2 indicates, the Fort Smith metropolitan area has the lowest SCI (88) of the five metropolitan areas in Arkansas. This relatively low sales conversion index, however, conceals the fact that Sebastian County and the city of Fort Smith have sales conversion indexes of 106 and 129, respectively.

Crawford and Sequoyah Counties, Oklahoma are also part of the metropolitan area and have SCIs of 47 and 66, respectively. Franklin, Logan, and Scott Counties and the Fort Smith suburban area also have relatively low sales conversion indexes. This suggests that the city of Fort Smith and Sebastian County are strong trade centers drawing much of their business from the rest of the metropolitan area and the surrounding satellite counties.

Little Rock/North Little Rock Metropolitan Area

The Little Rock/North Little Rock metropolitan area is located in the central part of the state and contains the state capital. It is the largest metropolitan area in Arkansas with a population of 508,900. The metropolitan area comprises Faulkner, Lonoke, Pulaski, and Saline Counties. Pulaski County contains Little Rock, North Little Rock and Jacksonville, the major cities in the metropolitan area.

The SCI for the Little Rock/North Little Rock metropolitan area is 95 (Table 3). This figure, however, conceals a pocket of retail strength in the cities of Little Rock and North Little Rock. With sales conversion indexes of 120 and 151, respectively, these cities appear to be experiencing substantial amounts of inshopping. This inshopping appears to be coming largely from Faulkner, Lonoke, and Saline Counties in the metropolitan area and from Hot Spring, Grant, and Prairie Counties outside the metropolitan area. Since the Little

Table 2
Sales Conversion Index for the Fort Smith Metropolitan Area

	Total Retail Sales ($000)	÷	Effective Buying Income ($000)	=	Conversion Factor	Sales Conversion Index
Fort Smith Metropolitan Area	891,779		1,832,275		48.7	88
Crawford County	103,013		394,068		26.1	47
Sebastian County	701,757		1,199,357		58.5	106
Fort Smith City	672,160		940,174		71.5	129
Sequoyah, Oklahoma	87,009		238,850		36.4	66
Suburban Total	219,619		892,101		24.6	44
Satellite Counties:						
Logan County	69,973		177,967		39.3	82
Scott County	23,439		81,192		28.9	60

Note: The benchmark conversion factor for the metropolitan areas (55.4) was derived from aggregate figures for all metropolitan areas in Arkansas. The benchmark conversion factor for the satellite counties (47.8) was derived from aggregate figures for all non-metropolitan counties in Arkansas.
Source: "1987 Survey of Buying Power," *Sales and Marketing Management*, 139 (July 27, 1987).

Rock/North Little Rock metropolitan area is generally considered the state's dominant trade center, it seems reasonable to conclude that at least some amount of retail trade flows from virtually all parts of the state.

Pine Bluff Metropolitan Area

The Pine Bluff metropolitan area, with a population of 89,900, is the smallest of Arkansas' five metropolitan areas and is located approximately 45 miles southeast of Little Rock. While the metropolitan area has a SCI of 103, the city of Pine Bluff is the area's primary center of retail trade with a sales conversion index of 130 (Table 4). It appears the inflow of trade into this area is coming from the Pine Bluff suburban area as well as from Grant, Cleveland, and Lincoln Counties nearby. Cleveland County's SCI of 19 is particularly low and indicates that a substantial amount of outshopping is occurring.

Texarkana Metropolitan Area

The Texarkana metropolitan area, located in the southwest corner of Arkansas, comprises Miller County, Arkansas, and Bowie County, Texas, with populations of 38,900 and 82,700 respectively. The twin cities of Texarkana, Arkansas, and Texarkana, Texas, are the only cities in the metropolitan area. The metropolitan area as a whole has a SCI of 118 and appears to be benefitting from a substantial amount of inshopping (Table 5). This inflow of retail trade appears to be coming from Little River, Hempstead, Lafayette, Nevada, and Columbia Counties in Arkansas. Although not included in the analysis, additional retail trade probably flows from rural areas in northeast Texas.

Table 3

Sales Conversion Index for the Little Rock/North Little Rock Metropolitan Area

	Total Retail Sales ($000)	÷	Buying Effective Income ($000)	=	Conversion Factor	Sales Conversion Index
Little Rock/North Little Rock Metropolitan Area	3,159,547		5,993,371		52.7	95
Faulkner County	239,272		565,341		42.3	76
Lonoke County	131,017		317,159		41.3	75
Pulaski County	2,624,550		4,546,925		57.7	104
Jacksonville City	161,615		305,885		52.8	95
Little Rock City	1,672,070		2,517,730		66.4	120
North Little Rock City	706,362		842,395		83.9	151
Saline County	164,708		563,946		29.2	53
Suburban total	619,500		2,327,361		26.6	48
Satellite Counties:						
Hot Spring County	96,139		258,214		37.2	78
Grant County	34,501		134,025		25.7	54
Prairie County	30,021		70,071		42.8	90

Note: The benchmark conversion factor for the metropolitan areas (55.4) was derived from aggregate figures for all metropolitan areas in Arkansas. The benchmark conversion factor for the satellite counties (47.8) was derived from aggregate figures for all non-metropolitan counties in Arkansas.

Source: "1987 Survey of Buying Power", *Sales and Marketing Management* 139 (July 27, 1987)

When Texarkana, Arkansas, and Texarkana, Texas, are analyzed separately, some interesting insights emerge. The SCI for Texarkana, Arkansas, is 151 and that for Texarkana, Texas, is an even stronge 238. Additional insights are provided when sales conversion indexes are calculated for various retail store groups (Tables 6 and 7).

Texarkana, Texas, is a particularly strong market for shopping goods which consumers are likely to spend substantial amounts of time shopping for and are likely to be purchased with credit. Sales conversion indexes for Texarkana, Texas are 272 for furniture/furnishings/appliances, 327 for general merchandise, and 314 for automotive. On the other hand, the SCIs for Texarkana, Arkansas, are 144 for furniture/furnishings/appliances, 69 for general merchandise, and 38 for automotive.

From these figures it appears that Texarkana, Texas, is benefitting from a net inflow of consumers from Arkansas who cross the state line to purchase shopping goods. This flow of retail trade to Texarkana, Texas, can probably be attributed to the differences in interest rates

Table 4
Sales Conversion Index for the Pine Bluff Metropolitan Area

	Total Retail Sales ($000)	÷	Effective Buying Income ($000)	=	Conversion Factor	Sales Conversion Index
Pine Bluff Metropolitan Area:	457,681		799,560		57.2	103
Jefferson County	457,681		799,560		57.2	103
Pine Bluff City	451,560		626,071		72.1	130
Suburban Total	6,121		173,489		3.5	6
Satellite Counties:						
Grant County	34,501		134,025		25.7	54
Cleveland County	6,232		67,751		9.2	19
Lincoln County	27,566		83,071		33.2	69

Note: The benchmark conversion factor for the metropolitan areas (55.4) was derived from aggregate figures for all metropolitan areas in Arkansas. The benchmark conversion factor for the satellite counties (47.8) was derived from aggregate figures for all non-metropolitan counties in Arkansas.
Source: "1987 Survey of Buying Power," *Sales and Marketing Management* 139 (July 27, 1987)

that existed for a number of years. Prior to 1983, goods financed in Arkansas were subject to a 10 percent usury law. Retailers in Texas, on the other hand, normally charged 18 percent interest on credit sales. Consequently, most retailers of shopping goods chose to locate on the Texas side of Texarkana where higher interest rates could be charged. Additionally, Texas had no personal income tax during this time and entrepreneurs were attracted to the Texas side to avoid paying state income taxes on their profits.

The SCIs for Texarkana, Arkansas, are particularly strong in the food and drug store groups with SCIs of 265 and 314, respectively. Since goods sold in these stores are normally purchased on a cash basis, Arkansas' usury law had little impact on these merchants' decisions to locate on the Arkansas side. However, the Arkansas legislature exempted Texarkana, Arkansas, from the state sales tax on food and drugs. This appears to at least partially account for the food and drug store groups' relatively high sales conversion indexes.

The sales tax exemption for food and drug items was intended to help merchants compete with stores in Texarkana, Texas, where sales tax on food and drug items is also exempted. As a result, residents of surrounding Arkansas counties who pay 4 percent sales tax on food and drug items at home are also attracted to the Texarkana area.

Conclusions and Implications

The retail sales and sales conversion indexes for Arkansas' metropolitan areas are summarized in Table 8. As this data sug-

Table 5
Sales Conversion Index for the Texarkana Metropolitan Area

	Total Retail Sales ($000)	÷	Effective Buying Income ($000)	=	Conversion Factor	Sales Conversion Index
Texarkana Metropolitan Area	772,662		1,183,138		65.3	118
Miller County	192,433		374,821		51.3	93
*Texarkana, AR	184,936		221,706		83.4	151
Bowie County, TX	580,229		808,317		71.8	130
*Texarkana, TX	443,415		335,777		132.1	238
Suburban Total	144,311		625,655		23.1	42
Satellite Counties:						
Little River County	38,890		135,508		28.7	60
Hempstead County	82,738		195,688		42.3	88
Lafayette County	27,822		82,051		33.9	71
Nevada County	32,157		78,413		41.0	86
Columbia County	112,394		280,265		40.1	84

Note: The benchmark conversion factor for the metropolitan areas (55.4) was derived from aggregate figures for all metropolitan areas in Arkansas. The benchmark conversion factor for the satellite counties (47.8) was derived from aggregate figures for all non-metropolitan counties in Arkansas.
Source: "1987 Survey of Buying Power," *Sales and Marketing Management*, 139 (July 27, 1987)

gests, Arkansas' retail trade flows have a tremendous impact on its businesses and the business opportunities that exist. Arkansas' five metropolitan retail trade centers attract significant numbers of shoppers from the surrounding areas. These inshoppers are usually drawn to the area by more highly developed retail facilities with deeper and broader merchandise assortments.

The existence of significant amounts of inshopping behavior which is characteristic of these metropolitan trade centers indicates that opportunities exist for businesses that are able to capitalize on the inflow of consumers and expenditures. Potentially new businesses may interpret this inflow of consumers as an indication of market opportunity and may give this factor a great deal of weight when making location decisions. Existing businesses may want to expand into other lines of merchandise and into additional services. Retail stores that are not getting their share of inshoppers may want to locate in or near shopping malls and businesses that are likely to attract shoppers from other areas. Major department stores and mass merchandisers such as Wal-Mart and K-Mart, for example, often attract shoppers from outside the immediate trade area. Businesses that want to attract shoppers from other trade areas may want to direct their promotions and advertising to high potential communities through such local media as newspapers and radio stations.

Table 6

Sales Conversion Indexes for Various Store Groups in Texarkana, Texas

	Total Retail Sales ($000)	÷	Effective Buying Income ($000)	=	Conversion Factor	Sales Conversion Index
Food	63,238		335,777		18.8	165
Eating & Drinking Places	33,878		335,777		10.1	202
General Merchandise	84,710		335,777		25.2	327
Furniture/Furnishings/ Appliances	22,889		335,777		6.8	272
Automotive	113,671		335,777		33.9	314
Drug	11,199		335,777		3.3	236

Note: The benchmark conversion factors were derived from aggregate figures for the metropolitan areas in the state of Arkansas (retail sales for each store group and effective buying income). The benchmark conversion factors were: food stores, 11.4; eating and drinking places, 5.0; general merchandise, 7.7; furniture/furnishing/appliances, 2.5; automotive, 10.8; and drug stores, 1.4.

Source: "1987 Survey of Buying Power," *Sales and Marketing Management*, 139 (July 27, 1987)

Table 7

Sales Conversion Indexes for Various Store Groups in Texarkana, Arkansas

	Total Retail Sales ($000)	÷	Effective Buying Income ($000)	=	Conversion Factor	Sales Conversion Index
Food	66,959		221,706		30.2	265
Eating and Drinking Places	18,021		221,706		8.1	162
General Merchandise	11,675		221,706		5.3	69
Furniture/Furnishings/ Appliances	8,057		221,706		3.6	144
Automotive	9,011		221,706		4.1	38
Drug	9,661		221,706		4.4	314

Note: The benchmark conversion factors were derived from aggregate figures for the metropolitan areas in the state of Arkansas (retail sales for each store group and effective buying income). The benchmark conversion factors were: food stores, 11.4; eating and drinking places, 5.0; general merchandise, 7.7; furniture/furnishing/appliances, 2.5; automotive, 10.8; and drug stores, 1.4.

Source: "1987 Survey of Buying Power," *Sales and Marketing Management*, 139, (July 27, 1987)

Table 8

Summary

Retail Sales and Sales Conversion Indexes for Metropolitan Areas in Arkansas

	Total Retail Sales ($000)	Sales Conversion Index
Fayetteville/Springdale Metro Area	649,750	108
Fayetteville City	420,739	183
Springdale City	211,131	139
Fort Smith Metro Area	891,779	88
Fort Smith City	672,160	129
Little Rock/North Little Rock Metro Area	3,159,547	95
Little Rock City	1,672,070	120
North Little Rock City	706,362	151
Jacksonville City	161,615	95
Pine Bluff Metro Area	457,681	103
Pine Bluff City	451,560	130
Texarkana Metro Area	772,662	118
Texarkana, AR	184,936	151
Texarkana, TX	580,229	238

Source: "1987 Survey of Buying Power," *Sales and Marketing Management*, 139 (July 27, 1987)

The satellite counties which are located near metropolitan trade centers typically lose retail trade as consumers take advantage of the more extensive retail facilities nearby. When substantial amounts of outshopping is occurring, the community's business people should realize that their real competition is with nearby trade centers rather than with one another. When the amount of outshopping is large, these business people may need to cooperate in an effort to collectively compete with the metropolitan areas. Collective promotion efforts, development of complementary merchandise assortments, elimination of parking meters and other barriers to shopping, and beautification of downtown shopping areas may increase retail trade.

Even when large amounts of outshopping are occurring in a given satellite trade area, opportunities may still exist for retail businesses that are less vulnerable to outshopping behavior. Retail stores offering merchandise that is normally purchased on the basis of convenience are least likely to be affected by outshopping behavior. Grocery stores, hardware stores, service stations, convenience marts, and fast food

restaurants, for example, are less likely than clothing stores to be negatively impacted by outshopping.

Significant amounts of outshopping may also indicate that opportunities exist for businesses that, by their presence, can keep trade in the market area. Mass merchandisers such as Wal-Mart, and K-Mart, for example, may keep shoppers at home and even draw shoppers from nearby trade centers.

Finally, businesses in areas that are experiencing large amounts of outshopping may seek to develop product-service mixes that are difficult for businesses in other trade areas to duplicate. For example, an appliance dealer in such an area may want to place strong emphasis on quality service and rapid response to service problems. Competitors in more distant trade areas would find it difficult to match such a high level of locally provided service. Likewise, clothing stores may want to emphasize quality alterations, convenient pick-up of altered clothes, convenient merchandise returns, and personalized service.

1"1987 Survey of Buying Power," *Sales and Marketing Management* 139 (July 27, 1987), p. C-3.

Selected Arkansas and U.S. Economic Indicators

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A Look Back at the 1988 Arkansas Economy

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For Arkansans, available fourth quarter data confirm the expectation of 1988's being a better year than the original data for the first and second quarters had suggested.[1] The turnabout brings increased employment accompanied by a lowering unemployment rate, improved industrial production, and better agricultural returns than the drought presaged.

More specifically, for the year the civilian labor force grew 2.7 percent; unemployment rose 3.2 percent; and unemployment fell 4.9 percent. Note that unemployment rates in the fourth quarter were the lowest since 1979. Within the improvement trend, Manufacturing employment rose 4.1 percent while agricultural employment continued its downward slide at 2.2 percent.

Although the data for the fourth quarter is not yet available, Personal income is still projected to increase about 5 percent for the year, thus rising to an annual level near 29 billion.

Value added by manufacture dropped 7.1 percent in the first quarter but recovered by increasing 10.3 percent in the second quarter. The improvement although slowing has continued through year's end by another 2 percent.

Cash receipts for farm marketing, while still missing the fourth quarter returns, portend a very good year despite the drought and the resulting predictions of crop failure or limitation. The 1988 annual total, by benefitting from higher prices, could approach 4 billion.

Construction was in general depressed and ran well below the 1987 level. In fact, the reported 1988 levels of both residential and nonresidential construction contracts were the third lowest experienced in the 1980s.

Waterborne commerce was running at a depressed level with total tonnage the lowest since 1976. Internal tonnage for 1988 was at the lowest level since 1982.

In retrospect, 1988 in Arkansas has witnessed a spotty economic performance without giving any clear signals on the prospects for 1989. However, new revenues will likely be needed for the drive to build new roads to market, to up public school teacher pay, and to improve higher education's potential to contribute to state development. At the national level, the new administration and Congress must try to get a handle on such economic and financial posers as the national debt, budget deficit, the trade deficit, the savings and loan crisis, and the clean up of old nuclear weaponsplants, to mention only a few costly "won't go away" political irritants.

[1]Phillip Taylor, "1988: A Better Year Than Earlier Expected," *Arkansas Business and Economic Review*, Vol. 21, No. 2 (1988), pp. 38-39.

ARKANSAS LABOR FORCE ESTIMATES
November 1988, Not Seasonally Adjusted

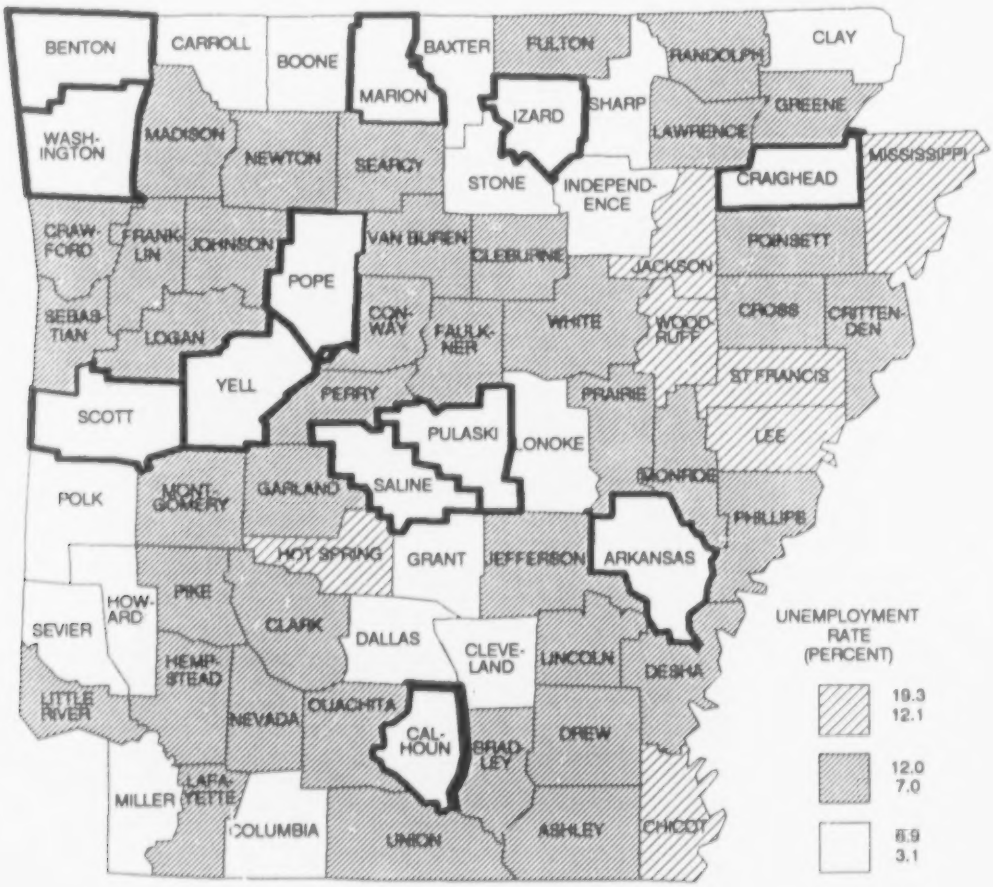
Area	Civilian Labor Force	Unemployment Rate	Total Employment
UNITED STATES	122,639,000	5.2	116,314,000
STATE OF ARKANSAS	1,113,900	6.8	1,038,300
Fayetteville-Springdale MSA	61,825	4.2	59,225
Fort Smith MSA	95,475	7.4	85,625
Little Rock-North Little Rock MSA	266,350	5.6	251,400
Pine Bluff MSA	37,325	7.5	34,525

County	Civilian Labor Force	Unemployment Rate	Total Employment	County	Civilian Labor Force	Unemployment Rate	Total Employment
Arkansas	10,425	5.0	9,900	Lee	4,525	16.0	3,800
Ashley	11,050	7.2	10,250	Lincoln	4,100	8.5	3,750
Baxter	11,150	6.1	10,475	Little River	5,200	7.7	4,800
Benton	51,750	3.1	50,125	Logan	9,225	7.0	8,575
Boone	15,150	5.9	14,250	Lonoke	17,525	5.7	16,525
Bradley	4,750	8.9	4,325	Madison	5,125	7.3	4,750
Calhoun	5,325	3.3	5,150	Marion	6,475	5.0	6,150
Carroll	9,925	6.0	9,325	Miller	17,650	6.5	16,500
Chicot	5,375	12.6	4,700	Mississippi	22,300	12.1	19,600
Clark	9,625	7.3	8,925	Monroe	5,200	7.2	4,825
Clay	8,475	6.2	7,950	Montgomery	2,650	8.5	2,425
Cleburne	8,150	7.1	7,575	Nevada	4,325	9.8	3,900
Cleveland	3,425	6.6	3,200	Newton	2,825	8.0	2,600
Columbia	12,450	6.0	11,700	Ouachita	13,875	7.0	12,900
Conway	7,900	7.9	7,275	Perry	4,300	7.0	4,000
Craighead	36,900	4.5	35,225	Phillips	9,425	10.6	8,425
Crawford	20,825	8.0	19,150	Pike	4,450	10.1	4,000
Crittenden	23,100	7.1	21,450	Poinsett	10,700	8.4	9,800
Cross	8,100	9.9	7,300	Polk	6,550	6.5	6,125
Dallas	4,200	6.0	3,950	Pope	23,825	4.8	22,675
Desha	7,275	7.9	6,700	Prairie	4,625	7.6	4,275
Drew	8,325	7.8	7,675	Pulaski	191,800	5.1	181,975
Faulkner	27,450	9.4	24,875	Randolph	7,425	7.7	6,850
Franklin	6,100	9.4	5,525	St. Francis	10,625	19.3	8,575
Fulton	3,800	7.9	3,500	Saline	29,575	5.2	28,025
Garland	30,800	8.1	28,300	Scott	5,775	5.2	5,475
Grant	6,300	6.0	5,925	Searcy	3,475	7.9	3,200
Greene	14,350	8.4	13,150	Sebastian	54,300	7.2	50,400
Hempstead	9,800	8.2	9,000	Sevier	6,400	5.9	6,025
Hot Spring	11,075	12.4	9,700	Sharp	5,875	6.4	5,500
Howard	5,825	6.0	5,475	Stone	3,775	6.6	3,525
Independence	16,050	6.5	15,000	Union	20,625	7.6	19,050
Izard	4,925	4.6	4,700	Van Buren	5,625	8.9	5,125
Jackson	8,000	12.8	6,975	Washington	61,825	4.2	59,225
Jefferson	37,325	7.5	34,525	White	25,775	9.2	23,400
Johnson	7,225	8.0	6,650	Woodruff	3,875	13.5	3,350
Lafayette	3,150	9.5	2,850	Yell	8,575	4.1	8,225
Lawrence	7,875	7.9	7,250				

Source: The Research and Statistics Section, Arkansas Employment Security Division, December 1988.

Labor Force Estimates
November 1988

In November, Arkansas' Civilian Labor Force fell 1,500 to total 1,113,900. Total Employment fell 2,400 to total 1,038,000. Thus, Unemployment rose 900 to 75,600. Of the 75 counties, Benton had the lowest unemployment rate, 3.1 percent, and St. Francis, the highest, 19.3 percent. The unemployment rate for the state, was a near 1980s low, 6.8 percent, for this year with 28 counties below the state rate. Nine counties however, had rates above 10 percent. Of the MSAs, Fayetteville-Springdale had the lowest unemployment rate, 4.2 percent, and Pine Bluff, the highest, 7.5 percent. The rates for the Little Rock-North Little Rock and Fort Smith MSAs were 5.6 and 7.4 percent, respectively.



Boundary lines of counties having an unemployment rate less than or equal to the national average of 5.2%

Bureau of Business and Economic Research
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Labor Force and Employment

Arkansas

(Seasonally adjusted)

Year	Month	Civilian Labor Force (Units)	Total Employment (Units)	Agricultural Employment (Units)	Manufacturing Wage and Salary Employment (Units)	Unemployment Rate (Percent)
1981		1,030,000	936,000	64,100	212,000	9.1
1982		1,018,000	919,000	63,440	196,000	9.8
1983		1,026,000	920,000	62,395	200,000	10.1
1984		1,044,000	951,000	61,600	210,000	8.9
1985*		1,051,000	960,000	46,250	210,000	8.6
1986		1,066,000	973,000	45,515	214,000	8.8
1987		1,088,000	1,000,000	45,000	219,000	8.1
1988		1,117,000	1,032,000	44,000	228,000	7.7
	Jan.	1,119,291	1,034,813	44,673	224,359	7.9
	Feb.	1,130,871	1,047,587	44,815	225,466	7.6
	Mar.	1,135,903	1,048,624	44,905	226,082	7.6
	Apr.	1,136,610	1,050,605	44,800	225,783	7.7
	May	1,131,175	1,039,309	44,406	224,648	8.3
	Jun.	1,124,843	1,035,291	44,144	227,506	7.9
	Jul.	1,113,683	1,026,026	43,863	228,400	7.8
	Aug.	1,101,974	1,011,657	43,726	227,864	8.1
	Sep.	1,095,944	1,005,582	43,549	227,827	8.1
	Oct.	1,092,004	1,008,891	43,496	229,606	7.3
	Nov.	1,106,386	1,030,877	43,503	231,114	6.9
	Dec.	1,120,000	1,041,320	43,715	231,807	6.7

*Note: Labor Force and Employment data for the period 1985 forward have been reestimated by the Employment Security Division. The reestimation resulted in relatively large revisions in Agricultural Employment, with revisions to a less degree in Total Employment and Civilian Labor Force data. Consequently, the data for 1985 forward are not comparable to that for the prior period.

Personal Income

Quarterly Changes in Personal Income, Arkansas and United States

(Seasonally adjusted, Percent)

	1987 Q-I thru 1987 Q-II	1987 Q-II thru 1987 Q-III	1987 Q-III thru 1987 Q-IV	1987 Q-IV thru 1988 Q-I	1988 Q-I thru 1988 Q-II	1988 Q-II thru 1988 Q-III
Arkansas	+ 0.3	+ 0.6	+ 1.6	+ 0.4	+ 4.5	+ 1.1
United States	+ 1.6	+ 1.7	+ 2.8	+ 1.1	+ 1.8	+ 1.7

Personal Income in Arkansas

(Seasonally adjusted, annual rate, Millions of dollars)

	1981	1982	1983	1984	1985	1986	1987	1988
Quarter								
Jan-Mar	18,648	19,432	20,729	23,410	25,125	26,087	27,223	28,038[R]
Apr-Jun	19,088	19,766	21,134	22,922	24,578	25,826	27,314	29,304[R]
Jul-Sep	19,534	19,817	20,898	23,258	24,604	26,174	27,469	29,627
Oct-Dec	19,290	20,406	21,871	23,646	24,991	26,452	27,920	
Annual	19,140	19,855	21,158	23,309	24,825	26,135	27,481	

[R]Revised

Industrial Production

Quarterly Changes in Industrial Production Arkansas and United States

(Seasonally adjusted, Percent)

	1987 Q-III thru 1987 Q-IV	1987 Q-IV thru 1988 Q-I	1988 Q-I thru 1988 Q-II	1988 Q-II thru 1988 Q-III	1988 Q-III thru 1988 Q-IV
Arkansas	+ 2.3	- 7.9	+ 10.3	+ 1.5	+ 0.5
United States	+ 1.7	+ 1.0	+ 1.1	+ 1.7	NA

Value Added by Manufacture in Arkansas

(Seasonally adjusted, annual rate, Millions of dollars)

	1981	1982	1983	1984	1985	1986	1987	1988
Quarter								
Jan-Mar	7,167.6	7,474.8	7,884.9	8,824.6	9,278.8	9,525.8	10,139.4	9,842.2[R]
Apr-Jun	7,388.1	7,569.1	8,131.9	8,959.7	9,282.1	9,661.5	10,257.6	10,851.2[R]
Jul-Sep	7,601.8	7,581.8	8,398.0	9,078.2	9,351.9	9,758.6	10,454.9	11,016.7[R]
Oct-Dec	7,589.5	7,746.9	8,522.0	9,165.2	9,425.3	9,984.0	10,694.4	11,070.3
Annual	7,436.8	7,593.2	8,234.2	9,006.9	9,334.5	9,732.5	10,386.6	10,695.1

[R]Revised

Cash Receipts from Farm Marketings

Quarterly Changes in Cash Receipts, Arkansas and United States

(Seasonally adjusted, Percent)

	1987 Q-I thru 1987 Q-II	1987 Q-II thru 1987 Q-III	1987 Q-III thru 1987 Q-IV	1987 Q-IV thru 1988 Q-I	1988 Q-I thru 1988 Q-II	1988 Q-II thru 1988 Q-III
Arkansas	+ 11.9	- 0.8	- 6.5	+ 11.8	+ 16.0	+ 11.7
United States	- 6.4	+ 3.9	+ 2.8	+ 1.6	+ 4.6	- 14.3

Cash Receipts from Farm Marketings in Arkansas

(Seasonally adjusted, annual rate, Thousands of dollars)

	1981	1982	1983	1984	1985	1986	1987	1988
Quarter								
Jan-Mar	3,023,940	3,399,389	2,741,619	3,521,324	3,363,628	3,085,598	2,964,346	3,431,543
Apr-Jun	3,612,735	3,523,159	2,455,942	3,855,999	3,227,535	2,888,484	3,316,185	3,987,887
Jul-Sep	3,726,639	2,778,928	3,062,947	3,303,148	3,152,621	3,334,387	3,288,045	4,450,365
Oct-Dec	3,203,139	3,315,654	3,084,389	3,233,516	3,439,215	2,844,038	3,073,323	
Annual	3,391,613	3,254,283	2,836,224	3,478,497	3,295,750	3,038,127	3,160,475	

Waterborne Commerce:
McClellan-Kerr Arkansas River Navigation System

Quarterly Changes in Total and Internal Tonnages

(Seasonally adjusted, Percent)

	1987 Q-II thru 1987 Q-III	1987 Q-III thru 1987 Q-IV	1987 Q-IV thru 1988 Q-I	1988 Q-I thru 1988 Q-II	1988 Q-II thru 1988 Q-III	1988 Q-III thru 1988 Q-IV
Total	- 17.2	+ 7.5	+ 0.7	- 17.6	- 3.5	+ 3.8
Internal	- 14.9	+ 14.0	- 25.6	+ 6.7	+ 5.0	- 33.9

Freight Traffic

(Seasonally adjusted, annual rate, Thousands of short tons)

Time Period		Traffic Tonnages			
		Inbound	Outbound	Internal	Total[1]
1979		2,026	3,456	2,932	8,926
1980		1,611	4,643	2,408	9,133
1981		1,564	5,684	1,741	9,446
1982		1,520	4,611	1,561	8,258
1983		1,918	3,905	1,904	8,017
1984		2,128	4,264	2,433	9,490
1985		2,103	3,191	2,521	8,335
1986		2,608	3,453	2,962	9,703
1987[2]		2,131	3,348	2,752	8,885
1988		2,087	3,087	2,107	7,788
	Jan-Mar	2,808	3,259	2,118	9,071
	Apr-Jun	1,745	3,035	2,259	7,474
	Jul-Sep	1,752	2,506	2,371	7,213
	Oct-Dec	2,169	3,615	1,567	7,488

[1]Total tonnage includes "through traffic."
[2]Sum of quarters does not equal annual totals because of moving seasonal adjustment factors.

Arkansas Construction Contracts

Residential Construction Contracts

(Seasonally adjusted, annual rate, Thousands of dollars)

	1981	1982	1983	1984	1985	1986	1987	1988
Quarter								
Jan-Mar	717,612	476,187	831,974	969,402	770,219	842,884	652,950	600,875
Apr-Jun	649,981	603,575	924,270	975,481	784,590	651,928	632,556	549,200
Jul-Sep	554,668	700,788	930,843	930,327	705,496	763,760	647,747	601,860
Oct-Dec	609,014	811,514	933,212	797,304	801,647	701,708	661,759	661,353
Annual	632,818	648,016	905,075	918,128	765,488	742,570	648,753	603,322

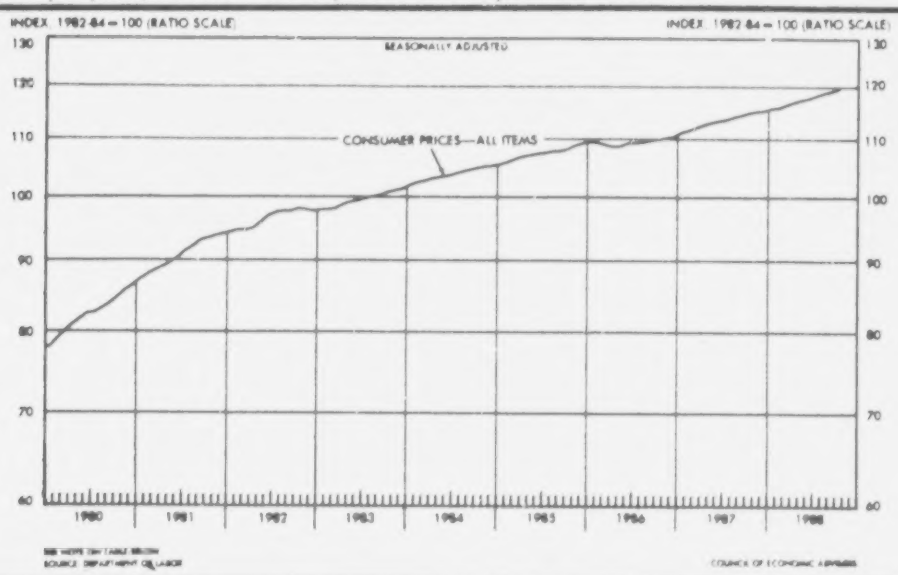
Nonresidential Construction Contracts

(Seasonally adjusted, annual rate, Thousands of dollars)

	1981	1982	1983	1984	1985	1986	1987	1988
Quarter								
Jan-Mar	363,356	389,417	286,833	461,592	386,837	476,516	400,391	392,002
Apr-Jun	279,378	212,698	359,775	444,186	411,369	328,485	483,757	294,073
Jul-Sep	252,037	306,050	370,032	507,932	454,883	541,870	420,714	260,301
Oct-Dec	307,569	213,596	449,173	450,036	562,806	311,998	323,122	338,541
Annual	300,585	280,440	366,453	465,937	453,974	414,717	406,996	321,229

CONSUMER PRICES—ALL URBAN CONSUMERS

In September, the consumer price index for all urban consumers rose 0.4 percent, seasonally adjusted (0.3 percent not seasonally adjusted). The index was 4.2 percent above its year-earlier level.



(1982–84 = 100, except as noted, monthly data seasonally adjusted, except as noted)

Period	All items [1]		Food	Housing					Fuel and other utilities	Apparel and upkeep	Transportation			Medical care	Energy [2]	All items less food, shelter, and energy
	Not seasonally adjusted (NSA)	Seasonally adjusted		Total [1]	Shelter						Total [1]	New cars	Motor fuel			
					Total	Renters' costs (Dec 1982 = 100)	Homeowners' costs (Dec 1982 = 100)	Maintenance and repairs (NSA)								
Rel. imp. [3]	100.0	.....	16.1	42.5	27.8	7.9	19.7	0.2	7.7	6.3	17.5	4.4	3.3	5.8	7.6	48.5
1980	82.4	.....	86.8	81.1	81.0	.....	.....	82.4	75.4	90.9	83.1	88.4	97.4	74.9	86.0	80.6
1981	90.9	.....	93.6	90.4	90.5	.....	.....	90.7	86.4	95.3	93.2	93.7	108.5	82.9	97.7	88.3
1982	96.5	.....	97.4	96.9	96.9	.....	.....	96.4	94.9	97.8	97.0	97.4	102.8	92.5	99.2	95.1
1983	99.6	.....	99.4	99.5	99.1	103.0	102.5	99.9	100.2	100.2	99.3	99.9	99.4	100.6	99.9	100.0
1984	103.9	.....	103.2	103.6	104.0	106.6	107.3	103.7	104.8	102.1	103.7	102.8	97.9	106.8	100.9	105.0
1985	107.6	.....	105.6	107.7	109.8	115.4	113.1	106.5	106.5	105.0	106.4	106.1	98.7	113.5	101.6	108.0
1986	109.6	.....	109.0	110.9	115.8	121.9	119.4	107.9	104.1	105.9	102.3	110.6	77.1	122.0	88.2	112.7
1987	113.6	.....	113.5	114.2	121.3	128.1	124.8	111.8	103.0	110.6	105.4	114.8	80.2	130.1	88.6	117.0
1987: Oct	115.3	115.0	114.7	115.3	122.8	128.6	126.9	112.8	103.0	112.7	107.2	115.5	83.0	132.4	89.3	118.5
Nov	115.4	115.3	114.8	115.5	123.1	128.8	127.2	113.5	103.4	113.1	107.7	115.7	83.0	133.0	89.6	118.9
Dec	115.4	115.5	115.3	115.9	123.8	129.5	127.9	113.3	103.3	112.2	107.4	115.7	81.6	133.5	88.9	118.9
1988: Jan	115.7	115.9	115.6	116.4	124.5	130.9	128.4	115.7	103.2	112.3	107.3	115.5	80.4	134.6	88.3	119.5
Feb	116.0	116.1	115.3	116.8	125.1	131.5	129.0	114.3	103.7	112.0	107.1	115.8	78.9	135.4	87.8	119.8
Mar	116.5	116.7	115.7	117.2	125.7	133.0	129.3	113.3	103.5	114.2	107.2	116.2	79.2	136.0	87.8	120.4
Apr	117.1	117.2	116.5	117.5	125.8	132.6	129.6	115.3	104.0	116.5	107.5	116.2	80.1	136.8	88.5	121.1
May	117.5	117.6	117.0	117.8	126.2	132.8	130.0	114.3	103.9	116.5	108.2	116.4	81.5	137.7	88.9	121.5
June	118.0	118.0	117.7	118.2	126.7	133.3	130.6	114.7	104.0	116.1	108.4	116.6	80.8	138.3	88.7	121.8
July	118.5	118.5	118.9	118.6	127.2	133.8	131.2	114.5	104.0	115.4	108.8	116.6	81.3	139.3	89.0	122.2
Aug	119.0	119.0	119.6	118.9	127.9	134.4	131.8	115.0	103.8	113.5	109.8	116.9	83.6	139.9	89.8	122.4
Sept	119.8	119.4	120.5	119.2	128.1	133.6	132.5	115.3	104.2	115.8	109.9	117.8	82.2	140.7	89.3	123.0
Oct.	120.2	119.9	120.7	119.6	128.4	133.9	132.8	115.0	105.2	117.9	110.2	118.0	81.4	141.4	89.4	123.8

[1] Includes items not shown separately.
[2] Household fuels—gas (piped), electricity, fuel oil, etc.—and motor fuel. Motor oil, coolant, etc. also included through 1982.
[3] Relative importance, December 1987.

Note.—Data beginning 1983 incorporate a rental equivalence measure for homeowners' costs and therefore are not strictly comparable with figures for earlier periods.
Data beginning 1987 and 1988 calculated on a revised basis.
Source: Department of Labor, Bureau of Labor Statistics.

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Cumulative Index, 1987-88

College of Business Administration

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Each manuscript should be double-spaced and submitted in triplicate. The length of the article should not exceed 20 pages including tables, appendices and references. Each chart or table should be camera ready, that is, an original on a separate page. References are to be listed on a separate page at the end of the submitted article and are to be numbered sequentially in order of textual citation with a corresponding superscript at the point of reference. The listing will be used as "Endnotes" to the published article and should be in footnote format.

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A Study of Factors Critical to Poultry Industry Location

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Introduction

The poultry industry is important to the economy of Arkansas. In 1986, farm cash receipts from broiler and turkey production in Arkansas totaled $1.308 billion. This was 44.3 percent of the total farm cash receipts for the State.[1] These receipts represented a growth of 17 percent from 1985, and 613 percent from 1967. Arkansas is the largest broiler producer in the nation, accounting for 15 percent of the U.S. total. The State produced 878 million broilers in 1987, compared to only 50 million in 1949.

In spite of the fact that the poultry industry represents such a significant part of the Arkansas economy, the industry is basically localized to certain areas in the central and western parts of the State. The economic depression of certain regions of the state, particularly the east and south, has prompted business leaders and local governments to seek to attract new or expanded poultry operations to their locales in an effort to achieve economic growth. These efforts have often failed due to a lack of knowledge of the factors essential to poultry industry operations. The purpose of the study reported here is to develop a basic understanding of the poultry industry, to identify critical factors relating to the locational aspects of the poultry industry, and to suggest a method by which these critical factors may be used to evaluate the suitability of particular areas for the poultry industry. The scope of the study was limited by design to broiler and turkey production, and did not consider egg production or chickens other than broilers.

The Integrated Poultry Complex

Today, the basic unit of the poultry industry is the integrated poultry complex. This complex is a product of over three decades of evolution. A modern integrated complex has a capacity of producing from 1 to 1.5 million birds per week. Although complexes will vary in small details, the typical complex consists of a processing plant, feed mill, and hatchery, which are owned by the poultry processor, and between two hundred and three hundred growing facilities, which are owned by independent growers who raise flocks of broilers and turkeys under contract to the

processor. Another smaller group of independent growers maintain breeder flocks which supply fertile eggs for the hatchery.[2] The processor obtains the eggs, hatches the chicks, places the chicks with the contract growers, furnishes feed and medications to the growers for the flock and then pays the contract grower for his efforts when the broilers are mature. The growers are compensated at different rates, determined competitively by their relative success in producing the maximum live weight of broilers or turkeys with the minimum amount of feed and medications. The growers are responsible for direct labor of growing, the growing facilities, and utilities. The processor buys the appropriate grains for conversion to feed at his feed mill and is usually responsible for the transportation of feed, live birds, and processed birds.

Meeting the constantly increasing demand for poultry has provided the incentive for development of the integrated poultry complex. The industry believes this growth will continue. However, the industry has changed over the past three decades so that a modern integrated poultry complex requires a very large investment and many years to develop fully. Consequently, most capacity additions undertaken by processors in recent years have been limited to two types: expansion of existing plants and acquisition. Expansion of an existing plant may involve an increase in the total number of birds which can be processed, and/or adding new, higher level processes which increase the value added at that plant. Alternatively, an existing plant can often be acquired at a relatively low cost, compared to that of new construction.

Poultry Industry Model

The first step in this examination of the poultry industry was to develop a model of the integrated poultry complex in an attempt to simplify a complex subject and aid in understanding the dynamics of the industry. That model was then critiqued and improved through subsequent discussions with management teams from four Arkansas poultry industry firms from different areas of Arkansas. The resulting model is diagrammed in Figure 1.

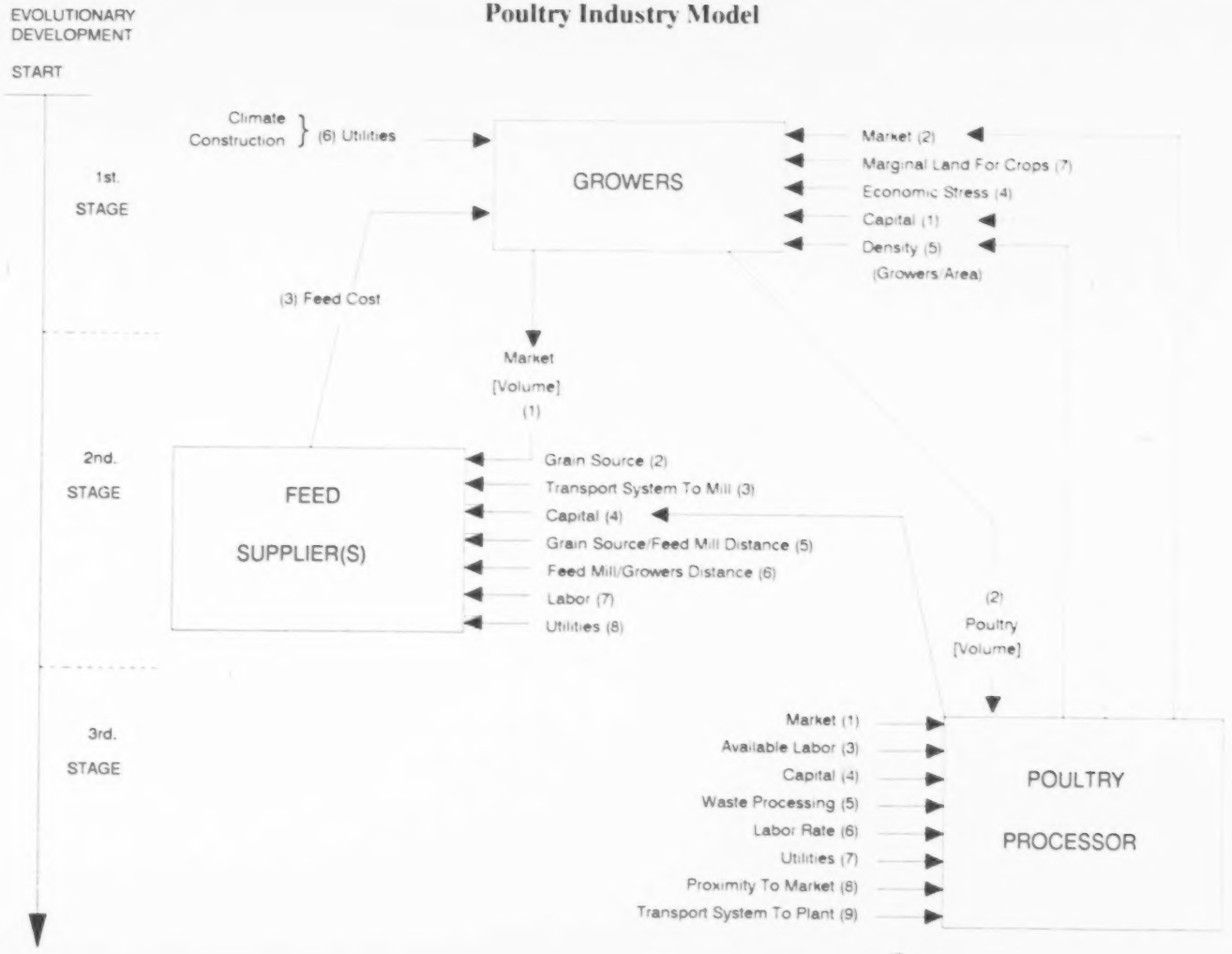
The detailed development of the model was based on initial interviews with various representatives of the Arkansas poultry industry regarding the critical factors impacting on the establishment and growth of the integrated poultry complex. First, the operations of a contemporary integrated poultry complex have been organized around three key groups or operations:

A. **Growers - live-grow operations.**
B **Feed Supplier(s) - feed production operations.**
C. **Poultry Processor - poultry processing operations.**

Fertile egg production, hatchery, and pullet rearing functions are necessary elements and are logically part of the grower or live-grow operations, although they are not explicitly shown. The three groups or functions as shown are not defined by ownership. In the modern integrated poultry complex, the feed supplier, poultry processor, and hatchery are usually a single firm while all other facilities are owned by independent contractors. Second, the sets of critical factors are considerations vital to the establishment and growth of each of the key groups or operations, which are identified and prioritized.

Figure 1

Poultry Industry Model



Brief descriptions of these critical factors as they apply to the three groups or operations are as follows:

A. **Grower Factors (live-grow operations)**
   1. **Capital:** Availability of local investment capital for construction of growing houses and related facilities.
   2. **Market:** A stable demand for live birds.
   3. **Feed Cost:** Low cost formulated grain and additive mixtures specifically developed for poultry growing.
   4. **Economic Stress:** Limited opportunities for maintaining a livelihood while remaining on the family farm.
   5. **Density:** Substantial concentration of growers in limited area to provide economic incentive for feed supplier and poultry processor.
   6. **Utilities:** Primary impact on heating and cooling costs for growing houses resulting from requirement for year-round growing in spite of climatic conditions and house construction.
   7. **Marginal Land for Crops:** Land with natural characteristics unsuitable for more profitable activities such as grain crops or urban development.

B. **Feed Supplier(s) Factors (Feed production operations)**
   1. **Market:** Substantial number of poultry growers (customers) in a restricted area.
   2. **Grain Source:** A low cost, constant supply of raw grain, primarily corn and/or milo.
   3. **Transportation System to Mill:** Available rail lines for bulk shipment of grain from low-cost sources to mill.
   4. **Capital:** Investment capital for mill construction.
   5. **Grain Source-to-Feed Mill Distance:** Shorter distances and favorable shipping rates in order to minimize delivered feed cost.
   6. **Feed Mill-to-Growers Distance:** Minimum distances for bulk feed transportation to individual growers in order to minimize delivered feed cost.
   7. **Labor:** Available labor at favorable rates for operating mill and delivery of feed.
   8. **Utilities:** Available power at favorable rates for operating feed and mill equipment.

C. **Poultry Processor Factors (poultry processing operations)**
   1. **Market:** A consumer demand for poultry meat products.
   2. **Poultry Volume:** A large and stable source of live birds of types and sizes required for the consumer market.
   3. **Available Labor:** A concentrated and large labor pool to meet the demands of labor intensive processing operations.
   4. **Capital:** Major investment capital for processing plant, equipment, and related facilities.
   5. **Waste Processing:** Company and/or municipal facilities to process large quantities of liquid and solid waste products to acceptable environmental standards for disposal.

6. **Labor rate:** Low labor rates for labor intensive operations.
7. **Utilities:** Primarily a suitable source of water to meet large requirements of processing operations. Also, electrical power for equipment operation.
8. **Distance to Market:** Minimize cost of shipping from processor to area distributors.
9. **Transportation System to Plant:** Primarily highway system transport of live birds to plant and shipment of processed meat products by refrigerated trucks

The use of the above factors in evaluating area or regional suitability for the poultry industry is presented in the following section.

Third, the Poultry Industry Model demonstrates that the three key functions become linked or integrated when factors critical to the success of one key function are satisfied by another of the three key functions, (Note: The dotted line relationship from the poultry processor to grower's capital requirement implies loan guarantees and contractual price guarantees, as opposed to the direct supply of capital).

Fourth, the placement of the three key functions from the top to the bottom of the diagram depicts the evolutionary development of the integrated poultry complex. This evolution began with the development of groups of growers in particular locales in the post-World War II era and progressed to the second stage when groups of growers became increasingly organized and affiliated with regionalized suppliers of special, high efficiency feed. Finally, in the third stage, the poultry processor became established in the region and completed the integration process by providing a guaranteed market for the growers, and by assuming the role of feed supplier.

Poultry Industry Location Evaluation

As part of the second phase of the study, the above critical factors and a preliminary version of the Poultry Industry Model were sent to the industry team representatives for review. The representatives were requested to critique the selection of critical factors in the model and to assign a weight between 1 (low) and 10 (high) for each critical factor. The means of the weights obtained for each of the critical factors were then normalized so that the sum of the weights for each of the three sets of critical factors was equal to 1.000. Although not developed as scoring factors for the model, it should be noted that some industry representatives stressed the importance of a strong work ethic in choosing an area for an integrated poultry complex and a strong rural ethic among the potential growers.

The relative weight information obtained in the above process was then correlated and used for two purposes. First, the relative weights were used to determine the simple prioritization of critical factors shown in the Poultry Industry Model (Figure 1). Second, the weights have been used to develop a Relative-Aggregate Scoring Model for comparing alternate locations for integrated poultry complexes. The relative aggregate scoring format for an integrated poultry complex, including the composite scoring weights determined in this study, is shown in Figure 2.

Figure 2

Relative-Aggregate Scoring Model: A Suggested Format for Site-Locational Decisions for Integrated Poultry Complexes

Locational Factor	Weight of Factor	Assigned Score (0 to 1.000)	Weighted Score (Wt x Score)
GROWERS			
Capital	0.202		
Market	0.195		
Feed Cost	0.141		
Economic Stress	0.137		
Density	0.114		
Utilities	0.114		
Marginal Land	0.098		
SUBTOTAL -- GROWERS	1.000		(Max. = 1.000)
FEED SUPPLIER(S):			
Market	0.152		
Grain Source	0.140		
Transport to Mill	0.140		
Capital	0.132		
Distance: Growers	0.118		
Distance: Grain Source	0.106		
Labor	0.106		
Utilities	0.106		
SUBTOTAL -- FEED SUPPLIER(S)	1.000		(Max. = 1.000)
POULTRY PROCESSOR :			
Market	0.133		
Poultry Source	0.133		
Labor Availability	0.126		
Capital	0.123		
Waste Processing	0.113		
Labor Rates	0.099		
Utilities	0.099		
Transport to Plant	0.089		
Distance: Markets	0.085		
SUBTOTAL -- PROCESSOR	1.000		(Max. = 1.000)
TOTAL LOCATIONAL SCORE	3.000		(Max. = 3.000)

A particular advantage of this comparison method is that it facilitates the incorporation of both qualitative and quantitative factors into a single analysis. For a factor which is to be treated qualitatively, e.g. marginal land, the preferred approach is for a single evaluator to assign relative fractional scores between 0.0 and 1.0 for each of the potential complex sites under study. For a factor which is to be

considered quantitatively, e.g. labor rates, a better approach would be to determine the most favorable actual value (in this example, the lowest) and then divide this value by the actual value for each of the complexes. For example, suppose complexes A, B, and C have labor rates of $5.00, $4.00, and $6.00, respectively. The scores would then be:

-Complex A: $4.00/$5.00 = 0.800
-Complex B: $4.00/$4.00 = 1.000
-Complex C: $4.00/$6.00 = 0.667

Poultry Market Cost

As noted above, an advantage of the relative-aggregate scoring method for the comparison of alternative poultry complex sites is the ability to consider both qualitative and quantitative factors. However, it is desirable that the analysis which enters this evaluation process be as objective as possible and that subjective opinion and judgement be minimized. Probably the single most important quantitative index to consider in any such analysis is the market cost per pound of meat produced. Obviously, many of the critical factors discussed in the Poultry Industry Model have a direct effect on this cost. In order to better understand these relationships and provide a rational basis for assigning relative scores for the critical factors pertaining to transportation and location, the following general poultry production cost model was developed and examined. Ideally, the poultry industry may be described as a production process which converts F pounds of feed at a specified location to M pounds of meat at a second location. At present, the general guide is that two pounds of feed yields one pound of live bird, and the processed fresh meat weight is 60% of live bird weight. The Market Cost/lb. of Meat at the market location, defined as C ($/lb.), may be approximated by the following equation:

$$C = F/M\,[U_g + R_g(d_{g\text{-}M}) + U_f + R_f(d_{M\text{-}G})] + U_G + U_P + R_l(d_{G\text{-}P}) + R_m(d_{P\text{-}Mk}) + U_E,$$

where:

F = Quantity of feed (lbs.) consumed at growers location.

M = Quantity of fresh meat (lbs.) at market location resulting from consumption of F.

U_g = Unit cost of grain ($/lb.)

R_g = Unit rate of grain transport ($/lb./mile)

$d_{g\text{-}M}$ Grain source/feed mill distance (miles)

U_f = Unit cost of feed production ($/lb.)

R_f = Unit rate of feed transport ($/lb./mile)

$d_{M\text{-}G}$ = Feed mill/grower distance (miles)

U_G = Unit cost of grow excluding feed ($/lb.)

U_P = Unit cost of processing ($/lb.)

R_l = Unit rate of live-bird transport ($/lb./mile)

$d_{G\text{-}P}$ = Grower/processor distance (miles)

R_m = Unit rate of meat transport ($/lb./mile)

$d_{P\text{-}Mk}$ = Processor/market distance (miles)

U_E = Unit earnings. ($/lb.)

Of the various industry components, the grain source, growers, and market have factors which limit locational flexibility relative to the feed mill and processor. Consequently, in the evolution of the integrated poultry complex, the feed mill and processor have moved to the grower location to lower unit market cost by minimiza-

tion of the $d_{M\text{-}G}$ and $d_{G\text{-}P}$ distances and the associated transportation costs. To reflect this, it is assumed that the processor, feed mill, and grower are at the same location, i.e., $d_{M\text{-}G} = 0$ and $d_{G\text{-}P} = 0$. Thus:

$d_{g\text{-}p} = d_{g\text{-}M} + d_{M\text{-}G} + d_{G\text{-}P}$,

where:

$d_{g\text{-}p}$ = Grain source to grower/processor distance.

Any residual transport costs are absorbed into the unit processing cost, U_P, and unit grain cost, U_g, respectively. To further simplify, let:

Unit Total Feed Cost = $U_{ft} = U_g + U_f$

Unit Total Process Cost = $U_{Pt} = U_G + U_P + U_E$.

Substituting the above Market Cost/lb. of Meat function may be written as:

$C = F/M [U_{ft} + (R_g \times d_{g\text{-}P})] + (R_m \times d_{P\text{-}Mk} + U_{Pt}$.

Precise values for the various rates, distances, and costs can be determined and may, in general, vary somewhat with the particular area, company, and time period under consideration. However, this is beyond the scope of the present work. For purposes of illustrating some of the implications of the above cost function, the following typical values will be assumed:

F = 2 lbs. of grain will yield M = 0.6 lbs. of fresh meat, or F/M = 3.33

Unit Total Feed Cost, U_{ft} = $0.09/lb.

Freight rate for grain, R_g = $0.015/lb./1000 miles

Freight rate for meat, R_m = $0.030/lb./1000 miles

Unit Total Process Cost, U_{Pt} = $0.12/lb.

Then

$C = 3.33 (.09 = .015d_{g\text{-}P}) + .030d_{P\text{-}Mk} + .12$.

So that with $d_{g\text{-}p}$ = 1000 miles and $d_{P\text{-}Mk}$ = 1000 miles,

C = $0.50/lb.

One clear implication of the cost relationship is the great importance of transportation rates and consequent transportation costs. However, it also illustrates the importance to cost of the relative locations or placements of the grower/processor complex, the grain source, and the market. To emphasize this more relevant viewpoint, consider the various locational geometries which will give a certain fixed market cost/lb. of meat, e.g. C = $0.50/lb. in the above numerical example. If all other unit costs are assumed to be approximately constant, then the following relationship must hold between $d_{P\text{-}Mk}$ and $d_{g\text{-}P}$:

$d_{P\text{-}Mk} = 2.67 - 1.67\ d_{g\text{-}P}$

where:

$d_{P\text{-}Mk}$ and $d_{g\text{-}P}$ are in units of 1,000 miles.

Thus, the distance to market which a processor/grower complex may ship a pound of processed meat for a given limiting market cost ($0.50/lb. in the example) is directly dependent on the distance from the grain source to the processor/grower complex ($d_{g\text{-}P}$). Second, the maximum distance from the processor/grower complex to a market ($d_{P\text{-}Mk}$) having the specified market cost limit defines the radius of a potential market area that can be supplied at or below that cost. This diminishing potential market area as the processor/grower complex becomes more remote from the grain source is shown in Figure 3 using the $0.50/lb. market cost example.

Examination of Figure 3 strongly suggests a great advantage in having the grain source as close as possible to the processor/grower complex in terms of the market area which can be supplied at less than or equal to a given maximum market cost. Other considerations which may tend to offset this advantage of locating the grain

source and processor/grower complex in close proximity include:

1. Significant variances in the unit cost of grain at its source.

2. Critical factors pertaining to land-use and climate which tend to make a given area unsuitable for raising both grain and poultry.

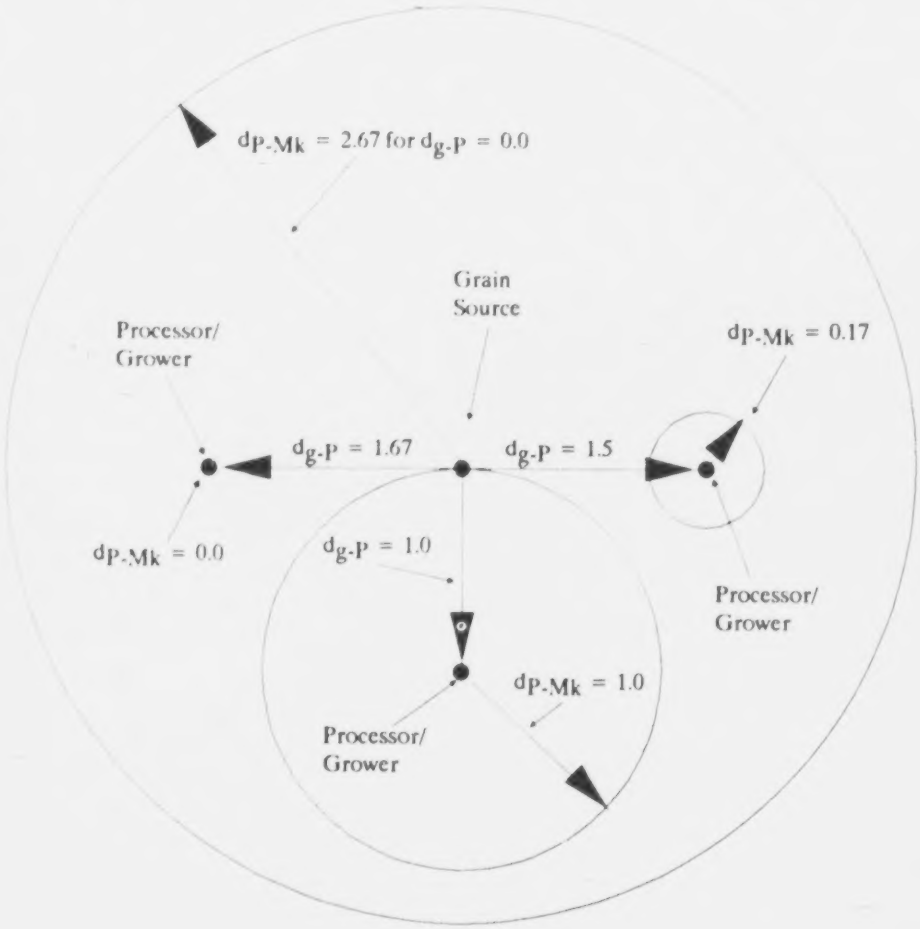
3. The actual density of poultry consumers in the potential market areas defined.

However, even with these considerations and with uniform transportation rates, there appears to be a distinct advantage in locating the processor/grower complex as close as possible to the grain source. Of

Figure 3

Economic Market Areas and Grain Source

Market areas defined by Market Cost less than or equal to $0.50/lb. with Grain Source-to-Processor/Grower Complex Distances, $d_{g\text{-}P}$ of 0.0, 1.0, 1.5, and 1.67 thousand miles. (Processor/Grower Complex to Market Distance, $d_{P\text{-}MK} = 2.67 - 1.67\ d_{g\text{-}P}$).



course, the grain source toward which the processor/grower complexes should attempt to locate will be that having the most favorable source cost of grain. Because the world market price of grain is set as the delivered cost at the Port of New Orleans, ideal grain sources for serving the processor/grower complexes will be those which, from the standpoint of transportation requirements, are most remote from the Port of New Orleans.

Additionally, this maximization of the market area supplied at or below some critical market cost can yield an earnings advantage if the processor can adopt a pricing policy such that the market cost/lb. is maintained constant throughout the area defined by that maximum radius. In other words, the saving derived from shipment to points closer than the maximum distance will become additional earnings. To summarize, examination of a generalized poultry production cost function shows that, when evaluating alternative locations for an integrated poultry complex, considerable advantage may be gained in terms of potential earnings and the size of market area supplied competitively by minizing the grain source-to-processor/grower complex distance. This minimization of distance would, of course, have to be accompanied with favorable scores for other critical factors in the Poultry Industry Model; and the maximized market area must have a significant consumer density within the defined area.

Conclusion

This study has presented a model which incorporates the critical factors or considerations vital to the success of an integrated poultry complex. The model is based on the knowledge and experience of senior management personnel in the present industry. In addition, approaches for evaluating and comparing integrated poultry complex sites have been suggested and discussed. It would be naive, however, to suppose that future industry capacity will be added by simple application of objective criteria such as those discussed. To just establish a complete, modern, and integrated poultry complex at a new area location would require the processor to make an extremely large capital investment in a very short period of time. Moreover, that investment would be subject to the risk created by the contractual link between growers and processors as compared to direct ownership. Alternatively, the processor could attempt to establish a new integrated complex by recreating the evolutionary development process. This would spread investment over a longer period of time and control risk. This approach also seems unlikely in that the primitive, less integrated complex could not produce at a cost competitive with those from existing large integrated complexes.

Consequently, the general approaches to capacity expansion being presently taken by large processor companies will probably continue. The first options almost always considered are either acquisition or expansion. But if they are not viable options, then, new integrated poultry complexes will be established sufficiently close to existing complexes so that feed production, hatchery operations, and poultry processing can be supported by existing facilities while a new community of growers is developed with contractual obligations to the processor. Later, feed production, processing, and supporting operations can

be phased to new complex facilities as they are established. This strategy of hopscotch growth results in a longer term investment program with a minimum of risk.

But even with this strategy of constrained expansion, the critical factors and considerations are still vital for potential site evaluation. Also, there are special circumstances where the above strategy may not be necessary or appropriate. One instance is where a governmental body guarantees the processing company a group of growers with facilities, thus eliminating a major source of risk to the processor. This situation is possible in many foreign countries. A second special circumstance is where existing integrated poultry complexes are being forced to relocate by the pressures of urban development and/or environmental considerations. This situation is presently facing complexes in some area of the heavily populated Northeastern United States. In such cases, the initial reaction may be that these companies will be placed at a disadvantage by being forced away from the large Eastern markets. However, as discussed in this study, this may not in fact be a serious problem if the critical factors for the new relocation sites are sufficiently favorable. This will be particularly true if the relationship between the grain source, processor/grower complex, and market area is preserved or improved. To state this another way, a processor/grower complex move toward a favorably priced source of grain may compensate, to some extent, for movement away from the existing market area. Such effects should be amenable to analysis with the tools developed in this study.

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[1] "1986 Arkansas Poultry Production" (Little Rock: Cooperative Extension Service, University of Arkansas, and Arkansas Agricultural Statistics Service, USDA, 1987). Available from Cooperative Extension Service, P.O. Box 391, Little Rock, AR 72203.

[2] T. Lional Barton, "The Integrated Poultry Industry" (Little Rock: Cooperative Extension Service, University of Arkansas, 1987). Available from same source as Reference 1.

The Association Between Major Foreign Exchange Rates and the U.S. Stock Prices: A Pilot Study

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Youngstown State University

Introduction

Foreign exchange rate fluctuation may affect both commodity and capital markets. The high degree of currency substitutability implied by the international monetary system increases the potential for instability of international liquidity. Monetary integration implies a loss of control of the domestic money supply. Increasingly in the role of commodity trade, an integration of the capital market and a flexible exchange rate regime suggests that the impact of exchange rate fluctuation can be structurally transmitted not only to the commodity markets but also to the capital markets.

Several studies have focused on the effect of U.S. currency devaluation on particular commodity markets--both agricultural commodities and manufactured products.[1] This study investigates potential effects of dollar devaluation on U.S. stock market prices. In particular, relationships between the U.S. stock prices and major foreign exchange rates--British Pound, French Franc, Japanese Yen, Swiss Franc, and West German Mark--are examined. The authors conducted both theoretical and empirical analyses. Empirically, they found that changes in most major foreign exchange rates are highly correlated with changes in U.S. stock prices.

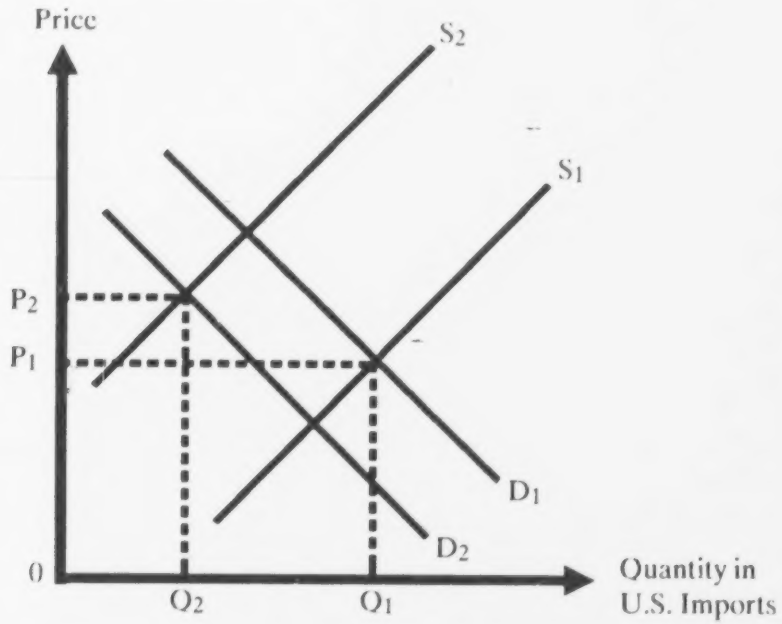
This study briefly addresses the economic theory underlying the impact of U.S. dollar devaluation in the next section[2] and presents research methodology and analysis of empirical results in subsequent sections.

Theoretical Analysis

From the U.S. viewpoint, devaluation of the dollar may be analyzed by changing the scale of the vertical axis of imports (Figure 1). One dollar now can buy fewer units of foreign products than it could before devaluation. Hence, selling prices of imports tend to rise causing a shift in both demand and supply curves for U.S. imports. The import demand curve will shift leftward from D_1 to D_2. The supply curve for imports will shift upward from S_1 to S_2. As a result, substitution effects will increase demand for U.S. products in domestic markets. Accordingly, the chart

Figure 1

Effect of U.S. Dollar Devaluation on its Demand for Imports



shows the over-time beginning and ending equilibrium points.

Devaluation of the U.S. dollar will result in decreases in relative prices of U.S. products in world markets (Figure 2). Demand for U.S. exports will shift rightward from D_1 to D_2, and supply of these products will shift downward from S_1 to S_2. Sales of exporting companies are expected to increase, as will company earnings. Consequently, the stock prices of these firms are expected to increase. As in Figure 1, this chart shows the over-time equilibrium positions of demand and supply.

Based on economic theory discussed above, dollar devaluation could increase:

1) demand for U.S. products in the world markets due to the decrease of relative prices of these products and
2) demand in the U.S. for domestic products because relative prices of imports become higher.

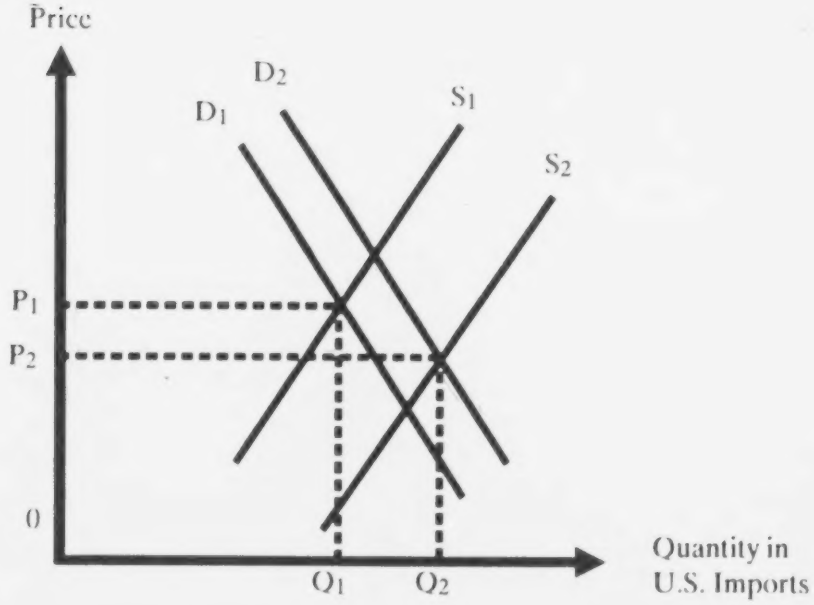
Increases in demand lead to a rise in domestic production and sales and exports of the U.S. companies. Consequently, their earnings are expected to rise. Perceived increases in earnings should lead to increases in stock prices of the domestic firms. However, this relationship is an empirical issue to be further discussed in the following sections.

Empirical Analysis

This study proposes to investigate whether the U.S. dollar devaluation, measured in terms of foreign exchange rates, affects U.S. stock prices, measured

Figure 2

Effects of the U.S. Dollar Devaluation on World Market Demand for U.S. Exports



in terms of four market indexes. The following data for the 1986 period (January 2 to December 31, inclusive) were used as variables in this study:

1) Daily foreign exchange rates, expressed in terms of rates of changes, between U.S. Dollar and one of the five major currencies--British Pound, French Franc, Japanese Yen, Swiss Franc, and West German Mark--computed from Wall Street Journal listings,[3] and
2) Four market indexes from the "CRSP Daily Master Index File," used as surrogates of stock prices, including "Standard and Poor (S & P) 500 - Index Level" (DSPI), "S & P 500 Return Index" (DSPR), and "New York Stock Exchange (NYSE) Value - Weighted Index" (VWRET), and "NYSE Equally - Weighted Index" (EWRET).[4] All indexes are also expressed as rates of change.

The Pearson coefficient of correlation between five foreign exchange rates and four market indexes are reported in Table 1. All correlation coefficients are negative which is consistent to the hypothesis that as dollars become weaker U.S. exports increase; the market perceives increases in current and future earnings of the U.S. multinational firms, hence, stock prices of these firms tend to rise.

Both British Pound and French Franc are statistically correlated with all four indexes (DSPI, DSPR, VWRET, EWRET).

Table 1

Correlations of Major Foreign Exchange Rates and the U.S.A. Stock Prices

Currencies		DSPI	DSPR	VWRET	EWRET
Pound	=	-0.1622	-0.1618	-0.1954	-0.1936
		(0.0113)	(0.0116)	(0.0022)	(0.0024)
French Franc	=	-0.1520	-0.1533	-0.1710	-0.1710
		(0.0178)	(0.0168)	(0.0076)	(0.0076)
Yen	=	-0.04887	-0.0481	-0.0840	-0.0832
		(0.4482)	(0.4558)	(0.1919)	(0.1959)
Swiss Franc	=	-0.0213	-0.0229	-0.0382	-0.0389
		(0.7408)	(0.7228)	(0.5538)	(0.5464)
Mark	=	-0.0830	-0.0840	-0.1112	-0.1114
		(0.1971)	(0.1917)	(0.0838)	(0.0932)

Note: DSPI = S & P 500-Index Level
DSPR = S & P 500-Return Index
VWRET = New York Stock Exchange Value-Weighted Index
EWRET = New York Stock Exchange Equally-Weighted Index
Significance level in parenthesis.

The German Mark is relatively highly correlated with only two NYSE indexes (VWRET and EWRET).

These findings are expected since the countries are major importers of U.S. products.

Unexpectedly, the Japanese Yen is not significantly associated with the U.S. stock prices as measured by the four market indexes although Japan is the world's largest importer of U.S. products.[5] Similar results are also found for the Swiss Franc. These findings could be partially explained by the fact that most U.S. exports to Japan are agricultural products while most firms whose stock prices are used in computing the four market indexes, in particular the S & P 500, are industrial firms.

Summary and Conclusions

In this study, the statistical relationship between foreign exchange rates and four stock market indexes in 1986 was examined. The empirical results indicate that both the British Pound and the French Franc show a significant relationship to the four market indexes (DSPI, DSPR, VWRET, EWRET); but the Japanese Yen and Swiss Franc do not significantly correlate to any of the four indexes, and the German Mark is relatively highly correlated with only two NYSE indexes (VWRET and EWRET). One limitation in this study is its usage of general stock market indexes as surrogates for stock prices of U.S. exporters. This limitation is

more pronounced in the Japanese Yen and Swiss Franc cases. Thus, since the indexes used in this study may not be valid measures of stock prices of firms which heavily export their products to Japan and Switzerland, a new stock price index should be constructed. Such an index would include only stock prices of firms that are major exporters to Japan and Switzerland for each of the five exchange rates. This is an empirical issue that should be investigated in future study. A remedy to this limitation is to construct five separate indexes for the five exchange rates used in the study, each of which consists of stock prices of firms exporting their products to the country in question.

An important implication from evidence found in this study is that foreign exchange rates may be used as a variable to explain price behavior in the capital market. However, this concept also merits research of its own.

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[1]Kost, William E., "Effects on An Exchange Rate Change on Agricultural Trade," *Agricultural Economic Research* (July 1976), pp. 99-106.

[2]Kindleberger, Charles P., *International Economics*, 4th. ed., (Homewood, Illinois: Richard D. Irwin, Inc., 1968).

[3]"Foreign Exchange," *Wall Street Journal*, January 2 - December 1986.

[4]CRSP Master Indexes File, 1986.

[5]U.S. Department of Commerce, Bureau of Census. *Statistical Abstract of the United States*, 1988 pp. 770-773.

Selected Arkansas and U.S. Economic Indicators

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Looking Ahead in Arkansas in 1989

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Arkansas' fourth quarter 1988 data for Personal Income and for Cash Receipts from Farm Marketings are not yet available. Nor are Arkansas' first quarter 1989 data available on any of our normally reported economic indicators.

There are, however, reports of monthly Arkansas data on Labor Force and Employment, Waterborne Commerce and Construction Contracts. Employment in January 1989 actually rose by 590, but an increase in the Labor Force resulted in a rise in the Unemployment rate from 6.7 to 7.9 percent. Water Commerce data for 1989 showed January's total tonnage at 735,037 with February's total only 478,880 tons which is the lowest monthly total since October 1986. Reports on Arkansas construction contracts for January and February 1989, indicated that in the Non-residential category, the value of $67.9 million was some 11 percent ahead of the total through February 1988. So too the value of Residential construction; for January and February 1989 at $85.8 million was 12 percent better than the total through February 1988. Also at the national level for February 1989 the Leading Economic Indicators have been reported down 0.3 percent and Retail Sales down 0.4 percent.

Some factors likely to affect both the Arkansas and national economies over the current year are the double fears of accelerating inflation and over-control in the Federal Reserve's fine tuning to avoid inflation; the heavy outlay of public funds to bail out the ailing Savings and Loan sector; the raising of the minimum wage; Congressional interest in solving child care and parental leave problems; heavy storm losses in the poultry industry; the current trade and budget deficits; and the slowing of consumer spending.

In Arkansas the farm economy was struck a heavy blow by the February storm which destroyed chicken houses and resulted in the loss of a million birds - breeders and broilers. Also, the overall state economy will be affected by the Little Rock School District settlement and the political infighting over tax reform and new taxes.

The economic consequences of the interplay of the above influences although unknown are imposing enough to raise caution signs. Perhaps we are not yet walking through an economic mine field; and surely we can still hope that no "bad-case" economic scenario will befall us anytime soon.

Labor Force and Employment

Arkansas

(Seasonally adjusted)

Year	Month	Civilian Labor Force (Units)	Total Employment (Units)	Agricultural Employment (Units)	Manufacturing Wage and Salary Employment (Units)	Unemployment Rate (Percent)
1981		1,030,000	936,000	64,100	212,000	9.1
1982		1,018,000	919,000	63,440	196,000	9.8
1983		1,026,000	920,000	62,395	200,000	10.1
1984		1,044,000	951,000	61,600	210,000	8.9
1985*		1,051,000	960,000	46,250	210,000	8.6
1986		1,066,000	973,000	45,515	214,000	8.8
1987		1,088,000	1,000,000	45,000	219,000	8.1
1988		1,117,000	1,032,000	44,000	228,000	7.7
	Jan.	1,119,291	1,034,813	44,673	224,359	7.9
	Feb.	1,130,871	1,047,587	44,815	225,466	7.6
	Mar.	1,135,903	1,048,624	44,905	226,082	7.6
	Apr.	1,136,610	1,050,605	44,800	225,783	7.7
	May	1,131,175	1,039,309	44,406	224,648	8.3
	Jun.	1,124,843	1,035,291	44,144	227,506	7.9
	Jul.	1,113,683	1,026,026	43,863	228,400	7.8
	Aug.	1,101,974	1,011,657	43,726	227,864	8.1
	Sep.	1,095,944	1,005,582	43,549	227,827	8.1
	Oct.	1,092,004	1,008,891	43,496	229,606	7.3
	Nov.	1,106,386	1,030,877	43,503	231,114	6.9
	Dec.	1,120,000	1,041,320	43,715	231,807	6.7

*Note: Labor Force and Employment data for the period 1985 forward have been reestimated by the Employment Security Division. The reestimation resulted in relatively large revisions in Agricultural Employment, with revisions to a less degree in Total Employment and Civilian Labor Force data. Consequently, the data for 1985 forward are not comparable to that for the prior period.

Personal Income

Quarterly Changes in Personal Income, Arkansas and United States

(Seasonally adjusted, Percent)

	1987 Q-II thru 1987 Q-III	1987 Q-III thru 1987 Q-IV	1987 Q-IV thru 1988 Q-I	1988 Q-I thru 1988 Q-II	1988 Q-II thru 1988 Q-III	1988 Q-III thru 1988 Q-IV
Arkansas	+ 0.6	+ 1.6	+ 0.4	+ 4.5	+ 1.1	NA
United States	+ 1.7	+ 2.8	+ 1.1	+ 1.8	+ 1.8	+ 2.2

Personal Income in Arkansas

(Seasonally adjusted, annual rate, Millions of dollars)

	1981	1982	1983	1984	1985	1986	1987	1988
Quarter								
Jan-Mar	18,648	19,432	20,729	23,410	25,125	26,087	27,223	28,038
Apr-Jun	19,088	19,766	21,134	22,922	24,578	25,826	27,314	29,304
Jul-Sep	19,534	19,817	20,898	23,258	24,604	26,174	27,469	29,627
Oct-Dec	19,290	20,406	21,871	23,646	24,991	26,452	27,920	
Annual	,19,140	19,855	21,158	23,309	24,825	26,135	27,481	

Industrial Production

Quarterly Changes in Industrial Production Arkansas and United States

(Seasonally adjusted, Percent)

	1987 Q-III thru 1987 Q-IV	1987 Q-IV thru 1988 Q-I	1988 Q-I thru 1988 Q-II	1988 Q-II thru 1988 Q-III	1988 Q-III thru 1988 Q-IV
Arkansas	+ 2.3	- 7.9	+ 10.3	+ 1.5	+ 1.2
United States	+ 1.7	+ 1.0	+ 1.1	+ 1.7	+ 1.0

Value Added by Manufacture in Arkansas

(Seasonally adjusted, annual rate, Millions of dollars)

	1981	1982	1983	1984	1985	1986	1987	1988
Quarter								
Jan-Mar	7,167.6	7,474.8	7,884.9	8,824.6	9,278.8	9,525.8	10,139.4	9,842.2
Apr-Jun	7,388.1	7,569.1	8,131.9	8,959.7	9,282.1	9,661.5	10,257.6	10,851.2
Jul-Sep	7,601.8	7,581.8	8,398.0	9,078.2	9,351.9	9,758.6	10,454.9	11,016.7
Oct-Dec	7,589.5	7,746.9	8,522.0	9,165.2	9,425.3	9,984.0	10,694.4	11,146.7[R]
Annual	7,436.8	7,593.2	8,234.2	9,006.9	9,334.5	9,732.5	10,386.6	10,714.2[R]

[R]Revised

Cash Receipts from Farm Marketings

Quarterly Changes in Cash Receipts, Arkansas and United States

(Seasonally adjusted, Percent)

	1987 Q-II thru 1987 Q-III	1987 Q-III thru 1987 Q-IV	1987 Q-IV thru 1988 Q-I	1988 Q-I thru 1988 Q-II	1988 Q-II thru 1988 Q-III	1988 Q-III thru 1988 Q-IV
Arkansas	- 0.8	- 6.5	+ 8.2	+ 22.4	+ 10.1	- 10.6
United States	+ 3.9	+ 2.8	+ 1.6	+ 4.6	- 14.3	+ 2.6

Cash Receipts from Farm Marketings in Arkansas

(Seasonally adjusted, annual rate, Thousands of dollars)

	1981	1982	1983	1984	1985	1986	1987	1988
Quarter								
Jan-Mar	3,023,940	3,399,389	2,741,619	3,521,324	3,363,628	3,085,598	2,964,346	3,323,875[R]
Apr-Jun	3,612,735	3,523,159	2,455,942	3,855,999	3,227,535	2,888,484	3,316,185	4,068,010[R]
Jul-Sep	3,726,639	2,778,928	3,062,947	3,303,148	3,152,621	3,334,387	3,288,045	4,477,685[R]
Oct-Dec	3,203,139	3,315,654	3,084,389	3,233,516	3,439,215	2,844,038	3,073,323	4,004,358
Annual	3,391,613	3,254,283	2,836,224	3,478,497	3,295,750	3,038,127	3,160,475	3,968,482

[R]Revised

Waterborne Commerce:
McClellan-Kerr Arkansas River Navigation System

Quarterly Changes in Total and Internal Tonnages

(Seasonally adjusted, Percent)

	1987 Q-II thru 1987 Q-III	1987 Q-III thru 1987 Q-IV	1987 Q-IV thru 1988 Q-I	1988 Q-I thru 1988 Q-II	1988 Q-II thru 1988 Q-III	1988 Q-III thru 1988 Q-IV
Total	- 17.2	+ 7.5	+ 0.7	- 17.6	- 3.5	+ 3.8
Internal	- 14.9	+ 14.0	- 25.6	+ 6.7	+ 5.0	- 33.9

Freight Traffic

(Seasonally adjusted, annual rate, Thousands of short tons)

Time Period		Traffic Tonnages			
		Inbound	Outbound	Internal	Total[1]
1979		2,026	3,456	2,932	8,926
1980		1,611	4,643	2,408	9,133
1981		1,564	5,684	1,741	9,446
1982		1,520	4,611	1,561	8,258
1983		1,918	3,905	1,904	8,017
1984		2,128	4,264	2,433	9,490
1985		2,103	3,191	2,521	8,335
1986		2,608	3,453	2,962	9,703
1987[2]		2,131	3,348	2,752	8,885
1988		2,087	3,087	2,107	7,788
	Jan-Mar	2,808	3,259	2,118	9,071
	Apr-Jun	1,745	3,035	2,259	7,474
	Jul-Sep	1,752	2,506	2,371	7,213
	Oct-Dec	2,169	3,615	1,567	7,488

[1]Total tonnage includes "through traffic."

[2]Sum of quarters does not equal annual totals because of moving seasonal adjustment factors.

Arkansas Construction Contracts

Residential Construction Contracts

(Seasonally adjusted, annual rate, Thousands of dollars)

	1981	1982	1983	1984	1985	1986	1987	1988
Quarter								
Jan-Mar	717,612	476,187	831,974	969,402	770,219	842,884	652,950	600,875
Apr-Jun	649,981	603,575	924,270	975,481	784,590	651,928	632,556	549,200
Jul-Sep	554,668	700,788	930,843	930,327	705,496	763,760	647,747	601,860
Oct-Dec	609,014	811,514	933,212	797,304	801,647	701,708	661,759	661,353
Annual	632,818	648,016	905,075	918,128	765,488	742,570	648,753	603,322

Nonresidential Construction Contracts

(Seasonally adjusted, annual rate, Thousands of dollars)

	1981	1982	1983	1984	1985	1986	1987	1988
Quarter								
Jan-Mar	363,356	389,417	286,833	461,592	386,837	476,516	400,391	392,002
Apr-Jun	279,378	212,698	359,775	444,186	411,369	328,485	483,757	294,073
Jul-Sep	252,037	306,050	370,032	507,932	454,883	541,870	420,714	260,301
Oct-Dec	307,569	213,596	449,173	450,036	562,806	311,998	323,122	338,541
Annual	300,585	280,440	366,453	465,937	453,974	414,717	406,996	321,229

The Mineral Industry of Arkansas in 1988

The estimated value of nonfuel mineral production in Arkansas in 1988 increased to $321 million. Nationally, the State was a major producer of abrasives, bauxite, and bromine. Arkansas ranked 31st in the Nation in value of nonfuel minerals produced.

Nucor-Yamato Steel Co. started operations at its new minimill near Blytheville at midyear. The $175 million minimill is capable of producing 600,000 short tons of steel a year. The basic product of the minimill is I-beams. Reynolds Metals Co.'s Jones Mill reduction plant, closed in 1985, was donated to Hot Spring County for use as an industrial site. The plant, once a major producer of aluminum, was shut down because of economic conditions.

The State's Diamond Mining Advisory Task Force continued investigations concerning commercial mining in the Crater of Diamonds State Park. The Department of the Interior did not object to a test to determine the potential of the park for mining. Arkansas remained the country's leading producer of bromine as Dow Chemical Co. sold its brine fluid business to Tetra Technologies, Inc. Silica Products, Inc., Guion, sold its sand and gravel operations to Unimin Corp., while Tri-State Sand and Gravel Co. sold its facilities to Gifford-Hill & Co., Inc.

Table 1
Nonfuel Mineral Production in Arkansas[1]

Mineral		1987 Quantity	1987 Value (thousands)	1988[p] Quantity	1988[p] Value (thousands)
Abrasives[2]	short tons	W	W	1,175	$308
Clays	thousand short tons	908	$8,651	1,061	15,076
Gem stones		NA	1,800	NA	1,800
Sand and gravel:					
Construction	thousand short tons	[e]7,200	[e]23,900	8,300	23,400
Industrial	do	505	5,147	615	6,325
Stone:					
Crushed	do	15,234	63,847	14,500	62,200
Dimension	do	11	629	11	629
Combined value of bauxite bromine[e], cement, clays (fire clay 1986), gypsum, lime, talc and pyrophyllite, tripoli, and values indicated by symbol W		XX	160,188	XX	211,481
Total		XX	264,162	XX	321,219

[e]Estimated. [p]Preliminary. NA-Not available. W-Withheld to avoid disclosing company proprietary data, value included with "Combined value" figure. XX-Not applicable.

[1]Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

[2]Grindstones, pulpstones, and sharpening stones; excludes mill liners and grinding pebbles

Aluminum Company of America delayed closure of its bauxite mining and refining operations near Benton to early 1979. Strategic Minerals Corp. resumed its vanadium operations at Hot Springs, using various residues instead of ores. Demand for Arkansas quartz crystal remained strong even as increased imports from Brazil depressed prices.

Employment

Arkansas economy picked up slightly as the unemployment rate in October dropped to 6.7%, the lowest since 1979. For the first 9 months of 1988, employment in the mining and mineral related sectors was mixed. Mining employment was up 4% with stone, clay, and glass up 4.4% and primary metals up nearly 19%. The increase in primary metals was the largest durable goods employment gain during the year. Construction activity, however, was down 3.3%, impacting to a degree on the demand for aggregates. Construction employment remained consistently lower than 1987 levels.

Legislation and Government Programs.

The Diamond Mining Advisory Task Force, appointed in 1987 to study the feasibility of allowing commercial mining at the Crater of Diamonds State Park, held hearings during the year to receive public comment. The Task Force focused on two options: major commercial mining or no mining. Late in the year the Task Force recommended that preliminary tests be conducted to determine the potential for mining at the park. The testing would consist of 10 drill holes, 850 feet deep. Before any decision could be reached, it had to be determined if such a venture would be legal, because a Federal grant of $732,000 in 1972 was used to develop the park. Therefore the Department of Interior had to grant permission for any change in use and late in the year, the Department did indicate it would not oppose testing.

Review by Nonfuel Mineral Commodities.

Arkansas remained the predominant producer of **bromine** in the Nation. Tetra Technologies, Inc. acquired Dow Chemical Co.'s clear brine fluids business in May. Included in the acquisition was a 120-million-pounds-per-year calcium bromide plant in Magnolia, along with all patents, technology, and brine reserves with a life of at least 15 years. Brine fluids are used in the oil and gas business as drilling and completion fluids. **Crushed stone** quarried in the State included limestone, granite, sandstone, slate, novaculite, and dolomite; the State ranked high nationally in output of sandstone and slate. Construction and industrial **sand and gravel** were produced during the year; most operations were relatively small with no individual pit producing more than a million short tons. Silica Products, Inc. sold its industrial sand facility at Guion to Unimin Corp. Gifford-Hill & Co., Inc. purchased Tri-States Sand and Gravel Co.'s operation at Delight.

Arkansas led the Nation in output of **bauxite**. However, the Aluminum Company of America in January 1988 announced it would cease mining and refining bauxite at its facilities near Benton by October. Late in the year, the company postponed the shutdown until early 1989. The chemical operations will continue to

use alumina from the company's refinery at Point Comfort, Texas. The **clay** industry in Arkansas produced **common clay** and **kaolin**; the State ranked third nationally in output of kaolin. Weyerhaeuser Co.'s **gypsum** mine ranked in the top ten nationally, while its wall board plant ranked third.

Strategic Minerals Corp. resumed vanadium operations at its mill in Hot Springs. Feedstock included refinery residues, fly ash, slags, and spent catalysts. Demand for high grade quartz crystal remains strong, while that of medium and low grade values decreased. Imports of Brazilian quartz crystal increased and depressed prices.

Source: Adapted from *Mineral Industry Surveys*, U.S. Bureau of Mines, U.S. Department of Interior Annual, Preliminary Report., 1989.

ARKANSAS LABOR FORCE ESTIMATES
December 1988, Not Seasonally Adjusted

Area	Civilian Labor Force	Unemployment Rate	Total Employment
UNITED STATES	122,120,000	5.0	115,978,000
STATE OF ARKANSAS	1,102,700	7.0	1,025,800
Fayetteville-Springdale MSA	61,325	4.0	58,900
Fort Smith MSA	92,350	8.1	84,900
Little Rock-North Little Rock MSA	266,775	5.4	252,475
Pine Bluff MSA	36,625	7.2	33,975

County	Civilian Labor Force	Unemployment Rate	Total Employment	County	Civilian Labor Force	Unemployment Rate	Total Employment
Arkansas	9,800	5.4	9,275	Lee	4,275	18.1	3,500
Ashley	10,850	6.9	10,100	Lincoln	3,850	8.4	3,525
Baxter	11,000	6.4	10,300	Little River	5,025	6.5	4,700
Benton	51,450	3.6	49,600	Logan	9,100	7.1	8,450
Boone	15,225	5.4	14,400	Lonoke	17,625	6.0	16,575
Bradley	4,700	9.0	4,275	Madison	4,850	7.7	4,475
Calhoun	5,350	4.2	5,125	Marion	6,225	6.0	5,850
Carroll	9,800	8.2	9,000	Miller	18,000	6.3	16,875
Chicot	5,175	13.0	4,500	Mississippi	21,900	13.4	18,975
Clark	9,525	6.3	8,925	Monroe	4,850	7.7	4,475
Clay	8,200	7.3	7,600	Montgomery	2,525	10.9	2,250
Cleburne	7,850	7.6	7,250	Nevada	4,250	9.4	3,850
Cleveland	3,325	6.0	3,125	Newton	2,725	8.3	2,500
Columbia	12,450	5.2	11,800	Ouachita	13,850	6.7	12,925
Conway	7,750	7.4	7,175	Perry	4,250	7.1	3,950
Craighead	36,800	5.4	34,825	Phillips	9,250	13.2	8,025
Crawford	20,700	8.3	18,975	Pike	4,300	10.5	3,850
Crittenden	23,475	8.2	21,550	Poinsett	10,350	11.8	9,125
Cross	7,700	10.4	6,900	Polk	6,250	6.0	5,875
Dallas	4,350	5.7	4,100	Pope	23,700	5.3	22,450
Desha	6,775	7.7	6,250	Prairie	4,325	8.7	3,950
Drew	8,250	7.6	7,625	Pulaski	192,375	5.0	182,825
Faulkner	27,075	7.8	24,950	Randolph	7,300	7.9	6,725
Franklin	5,900	9.7	5,325	St. Francis	10,250	19.3	8,275
Fulton	3,675	8.8	3,350	Saline	29,700	5.3	28,125
Garland	30,700	8.6	28,075	Scott	5,675	4.8	5,400
Grant	6,400	5.9	6,025	Searcy	3,300	7.6	3,050
Greene	14,225	9.0	12,950	Sebastian	54,125	7.7	49,975
Hempstead	9,425	8.0	8,675	Sevier	6,325	5.9	5,950
Hot Spring	11,050	12.2	9,700	Sharp	5,650	6.2	5,300
Howard	5,800	5.2	5,500	Stone	3,675	7.5	3,400
Independence	16,000	6.6	14,950	Union	20,500	7.6	18,950
Izard	4,875	5.1	4,625	Van Buren	5,425	9.2	4,925
Jackson	7,600	13.2	6,600	Washington	61,325	4.0	58,900
Jefferson	36,625	7.2	33,975	White	25,600	10.8	22,825
Johnson	7,125	8.4	6,525	Woodruff	3,600	13.9	3,100
Lafayette	3,025	9.9	2,725	Yell	8,575	5.2	8,125
Lawrence	7,825	8.3	7,175				

Source: Labor Market Information Section, Arkansas Employment Security Division, January 1989.

Labor Force Estimates
December 1988

In December, Arkansas' Civilian Labor Force fell 15,100 to total 1,025,800. Total Employment fell 16,400 to total 1,025,800. Hence, Unemployment rose 1,300 to 76,900. Of the 75 counties, Benton County had the lowest unemployment rate, 3.6 percent, and St. Francis County, the highest, 19.3 percent. Twenty-nine counties had unemployment rates below the state rate of 7.0 percent while 13 counties had rates that exceeded 10 percent. Of the MSAs, Fayetteville-Springdale had the lowest unemployment rate, 4.0 percent, and Fort Smith MSA, the highest, 8.1 percent. The rates for the Little Rock-North Little Rock and Pine Bluff MSAs were 5.4 and 7.2 percent, respectively.

Boundary lines of counties having an unemployment rate less than or equal to the national average of 5.0%

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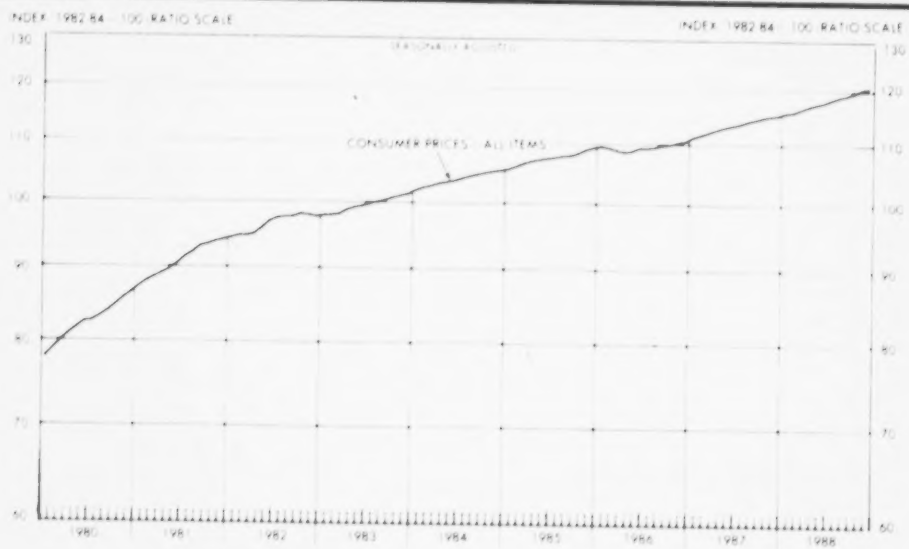
CONSUMER PRICES—ALL URBAN CONSUMERS

In December, the consumer price index for all urban consumers rose 0.3 percent, seasonally adjusted (0.2 percent not seasonally adjusted). The index was 4.4 percent above its year-earlier level.



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Employers' and Employees' Perceptions of On-the-Job Drug Abuse

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Introduction

For the past quarter century the business community has shared with the rest of society one of the most insidious problems in modern times. The problem of drug abuse can be found in every occupational classification from the unskilled laborer to the highest professional and managerial level. Similarly, on-the-job drug abuse exists in every size and type of business and in every region of the country.[1]

Except for flagrant cases, the presence of drug abuse is easy to overlook by managers who are unfamiliar with its symptoms.[2] Detection of the problem may not occur until the firm implements a program to collect and carefully analyze data on such things as accidents, tardiness, absenteeism, thefts, and worker productivity. Nevertheless, estimates of drug usage by employees range from 10% to 25% of the work force;[3] and there is evidence that the problem is growing.[4]

Cost to the Economy and the Individual Firm

Estimates of the economic cost of drug abuse in the workplace vary as much as estimates of the extent of usage. Frequently cited figures place the economic cost for alcohol and drug abuse at approximately $140 to $175 billion.[5] According to some estimates drug abuse alone accounts for about one-third of this cost. Such aggregate estimates provide valuable insight about the magnitude of the problem, but they fail to reflect the crippling effect that drug abuse can have on a particular firm.

The cost of drug abuse to an individual firm is reflected in subpar employee performance and an increase in accidents, absenteeism, and employee thefts. A company will lose 25% of a typical drug abusing employee's salary in lost productivity;[6] and, in some cases, the cost of a poor decision because an employee was under the influence of drugs may run into millions of dollars. For example, a drug-impaired American Airlines employee forgot to install a tape in the computer system and cost the company an estimated $19 million.[7]

According to many experts, employers are in a strong position to exert a positive influence on the workplace drug problem and, at the same, can be one of the most effective forces in combatting the drug problem in society at large.[8] These experts argue that employers have the ultimate weapon—the power to provide or deny

employment – and that the threat of losing their jobs is the one thing that will cause drug abusers to change their behavior. Conversely, Wrich persuasively argues that such optimism oversimplifies a very complex societal problem and ignores the reality of substance addiction.[9]

Dangers of Complacency

Whether or not business can play a major role in solving the problem for society at large, there can be little doubt that individual business firms have the right and an obligation to attempt to reduce the negative impact of on-the-job drug abuse. A passive approach to the problem may place the firm's survival and the safety of its employees in great jeopardy. Thus, each firm should develop a substance abuse policy, communicate the policy to each employee, and administer it in a fair but uncompromising manner.

The two most controversial issues in a substance abuse policy involve the methods used to identify abusers and the appropriate course of corrective action once abusers are identified. There has been disagreement between some labor unions and management on these issues, especially on the issue of using drug testing to identify abusers.[10] Consequently, the purpose of this study was to measure the perceptions of employers and employees on several on-the-job drug abuse issues in order to determine the areas of agreement and disagreement between the two groups.

Surveys of Employers and Employees

The employers' perceptions were collected from the members of a business executives panel via mail questionnaire. This panel was composed of management representatives of approximately 800 firms, ranging from very small to large, and spanning a wide variety of industries. Almost 60% of the responding executives were presidents or owners of their firms. Employees' perceptions were obtained by mail from a random sample of 900 households selected from telephone directories. The cover letter requested that the questionnaire be completed only by persons who were presently employed. Except for differences in the wording of some questions to reflect the perspectives of each group, the questionnaires were very similar.

In total, 345 executives and 411 households returned usable questionnaires within the cut-off period. This represents a response rate of 43 percent and 46 percent for the employers and employees, respectively. The results presented in this study are based on those response totals.

Perceptions of Employers and Employees

Although the responses of the two groups differed significantly on some issues, there was a surprising amount of agreement on most issues. Table 1 shows the percentage of each group reporting problems associated with drug abuse when asked "Which of the following specific problems associated with drug abuse has occurred in your firm or where you work?" The high percentage of employers and employees reporting that drug problems exist in their firms or places of employment suggests that the problem is truly ubiquitous.

Drug Testing

Approximately 11% of the executives and 25% of the employees answered "no"

Table 1

Percent of Employers and Employees Reporting Specific Drug Abuse Problems

	Executives	Employees
Poor job performance due to drug abuse	41%	39%
Arriving at work under the influence of drugs	31	33
Employee thefts to support drug habit	14	14
Buying or selling drugs at workplace	5	12
Damage to property or injury to people	8	13

when asked if employers have the legal right to test job applicants for drugs. Only 7% of the executives and 11% of the employees stated that employers do not have the right to test current employees. As shown in Table 2, a smaller percentage of the executives than employees agreed with the statement that drug testing should be a standard requirement for getting a job. Perhaps in responding to the statement many of the executives were taking into account such factors as the cost and administrative problems involved in testing all job applicants.

Less than one in five of either group agreed that testing a person for drugs violates a person's right to privacy. This response is generally consistent with their previous answers concerning the legality of drug testing. Slightly over half of each group agreed that it is not discriminatory to test for drugs only those employees who are in hazardous jobs. Taken as a whole, the employers and employees groups are in close agreement on the issue of using drug tests to identify drug abusers in the workplace. The fact that they also are in close agreement in the belief that drug abusing employees have a negative effect on the performance of non-abusing employees may help explain their approval of drug testing.

Disciplinary Action vs. Rehabilitation

On the issue of what course of action should be taken against the drug abuser, neither employers nor employees believed that alcohol abuse should be treated less harshly than drug abuse. They did not think that tough disciplinary action for dealing with drugs in the workplace would be detrimental to employees, and they thought a tough stance in dealing with drugs in the workplace is the most effective way to reduce drug problems in the general population. Both groups disagreed with the statement that drug use off the job should not concern the employer unless job performance was affected.

It was on the issues of rehabilitation and whether or not drug abuse should be treated like any other medical disability that employers and employees were most ambivalent and had the greatest divergence of opinion. Neither group thought it was business' responsibility to rehabilitate drug abusing employees. However, when asked (on a separate question) how an employer should deal with a drug abuser, 40% of the executives and 74% of the

Table 2

Executives' and Employees' Perceptions of Drug Abuse Problems in the Workplace

Statements		Agree		Disagree
1. Drug testing should be a standard requirement for getting a job.	*Executives*	45%	28%	27%*
	Employees	55	16	29
2. Testing a person for drugs violates a person's right to privacy.	*Executives*	11	13	76*
	Employees	19	17	64
3. It is not discriminatory to test for drugs only employees who are in hazardous jobs.	*Executives*	52	15	33
	Employees	55	15	29
4. Drug abusing employees have a negative effect on the performance of non-abusing employees.	*Executives*	80	11	8
	Employees	75	12	13
5. An employer should treat alcohol abuse less harshly than drug abuse.	*Executives*	14	14	72
	Employers	13	14	73
6. Tough disciplinary action for dealing with drugs in the workplace would be detrimental to employees.	*Executives*	14	18	68*
	Employees	21	22	57
7. A tough stance in dealing with drugs in the workplace is the most effective way to reduce drug problems in the general population.	*Executives*	56	25	19
	Employees	56	24	21
8. Drug use off the job should not concern the employer unless job performance is affected.	*Executives*	26	13	61
	Employees	26	17	58
9. Drug abuse problems of an employee should be treated like any other medical disability.	*Executives*	37	21	43*
	Employees	52	14	34
10. It is business' responsibility to rehabilitate drug abusing employees.	*Executives*	6	19	75*
	Employees	17	19	64

NOTE: The questionnaire employed a 5 point scale. The strongly agree was collapsed to the agree and the strongly disagree was collapsed into the disagree for the convenience of presentation.

* The difference between executives' and employees' agreement with these statements was statistically significant at the .05 level.

40% of the executives and 74% of the employees favored the firm's requiring the employee to obtain professional counseling. Only 23% of the executives and 12% of the employees favored immediate discharge of the employee with the remaining 37% and 14%, respectively, preferring to warn the employee and then take a "wait and see" approach (See Table 3). Slightly over half of the employees agreed that drug

Table 3
Comparison of Executives' and Employees' Opinions for Dealing with Drug Abusing Employees

	Executives	Employees
Discharge employee immediately	23%	12%
Require professional substance abuse counseling	40	74
Warn employee, then take a "wait & see" approach	37	14

abuse should be treated like any other medical disability while 37% of the executives agreed with the statement (See Table 2, Question 9).

Suggested Courses of Action

The findings of this study support the frequently stated assertion that substance abuse permeates the American workplace. Moreover, the fact that approximately 40% of both executives and employees reported one or more specific drug related problems in their firms should cause all executives to review the status of their organizations relative to drug abuse.

Despite the differences reported by the employers and employees on the firm's reaction to the discovery of a drug abusing employee, overall the executives and the employees have very similar opinions on most of the workplace drug abuse issues. This survey suggests that there is a wide area of agreement between the two parties concerning corrective actions for addressing on-the-job drug abuse.

In order to cope effectively with drug abuse, each firm should develop a system for discovering the existence of on-the-job drug abuse. Although only a small minority of the employees responding to this study opposed drug testing, whether or not it should be used by a particular firm depends on the needs and resources of that firm. In many situations, training supervisors to recognize the symptoms of a drug impairment will be less disruptive and more cost effective than drug testing.

Having an effective detection system is a necessary but not sufficient condition for dealing with problems associated with drugs in the workplace. The course of action taken by the employer after discovery of drug abuse is crucial to handling the problem successfully. Although most of the executives and employees did not think it is business' responsibility to rehabilitate drug abusing employees, more favored requiring professional counseling than any other course of action. The experience of several companies suggests that while it may not be business' responsibility to rehabilitate drug abusers, it is certainly in the firm's best interest to do so.[11] In these companies the cost of rehabilitation was more than offset by increases in productivity. Perhaps a greater benefit of rehabilitation is the positive effect that it can have on the individual drug abuser. The long-term value of regaining a productive human being from a former drug

abuser may far exceed the short-term economic benefits of rehabilitation.

It is generally accepted that enlightened management takes its employees' point of view into account when developing personnel policies. Frequently the conflicting goals of the employees and the employer create an environment that is not conducive to efficient operation or harmonious employer-employee relations. However, this study suggests that the goals of employer and employee are surprisingly similar on most of the issues relating to substance abuse in the workplace. Consequently, it should be relatively easy to overcome any obstacles that may arise in developing policies for coping with drug abuse and obtaining the support of labor in application of the policies.

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[1]Victor Schacter and Thomas E. Geidt, "Cracking Down on Drugs," *Across the Board*, November, 1985, 28-37; Jerry Kinard, John Tanner, and Peter Wright, "Controlling Substance Abuse in the Workplace," *Business*, Oct-Dec, 1987, p. 25.

[2]Abby Brown, "Employment Tests: Issues Without Clear Answers," *Personnel Administrator*, September, 1985, p. 46.

[3]William Hoffer, "Business' War on Drugs," *Nation's Business*, October, 1986, p. 19; M. L. Stein, "Drugs in the Newsroom," *Editor and Publisher*, November 8, 1986, p. 18; and James T. Wrich, "Beyond Testing: Coping With Drugs at Work," *Harvard Business Review*, January-February, 1988, p. 120.

[4]Peter A. Susser, "Legal Issues Raised by Drugs in the Workplace," *Labor Law Journal*, January, 1985, p. 43.

[5]Kenneth R. Williams, "Linking Risk Avoidance and Insurance Coverage," *Personnel Administrator*, December, 1986, p. 69; Hoffer, p. 19.

[6]Martin Everett, "Drugs Can Bust Your Sales Force," *Sales and Marketing Management*, March, 1987, p. 44; Joseph F. Madonia, "Managerial Response to Alcohol and Drug Abuse Among Employees," *Personnel Administrator*, June, 1984, p. 134.

[7]Janice Castro, "Battling the Enemy Within," *Time*, March, 1986, p. 55.

[8]Hoffer, p. 22; and Stein, p. 18.

[9]Hoffer, pp. 127-28.

[10]Dale Masi, "Company Responses to Drug Abuse From AMA's Nationwide Survey," *Personnel*, March 1987, p. 44; Brown, p. 48; and Robert T. Angarola, "Drug Testing: Is it Legal," *Personnel Administrator*, September, 1985, p. 86.

[11]Wrich, pp. 126-27; and Williams, p. 74.

Use of Capital Budgeting Methodologies by Arkansas Manufacturers

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James A. Millar
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Introduction

The advantages of using discounted cash flow methods for capital budgeting decisions have been discussed in college classes, textbooks and executive seminars for many years. Empirical research on the use of these methods has concentrated on large firms. Generally the conclusions have shown that over time an increasing proportion of large firms is employing discounted cash flow techniques (either net present value or internal rate of return) as part of the capital budgeting process. In their 1965 survey, Robichek and MacDonald showed that over time use of these techniques by survey respondents grew from 9 to 47 percent.[1] Klammer similarly showed a growth trend in the adoption of capital budgeting techniques by large manufacturers from 1959 to 1970.[2]

Schall, Sundem, and Geijsbeek found that 86 percent of large manufacturing firms responding to their survey used discounted cash flow methods.[3] Surveys by Scapens and Sales[4] and by Moore and Reichert[5] showed the frequencies to be 84 percent and 86 percent, respectively. Moore and Reichert found that 81.8 percent of sampled firms having less than $1 billion in assets used at least one of either the net present value or the internal rate of return methodologies.[6] These percentages increased to 87.8 percent for the firms with assets between $1 billion and $5 billion and 96.9 percent for firms larger than $5 billion. These studies support the observation that managements of large companies have adopted discounted cash flow methods to a considerable extent.

We have very limited information, however, about the effect of firm size on the adoption of these techniques. We do not know whether economies of scale allow only large firms to develop and maintain these sophisticated systems to evaluate projects.

In a survey of "moderately" sized firms, Viscione and Neuhaser found that for routine replacement decisions relatively few respondents used discounted cash flow methods.[7] Instead respondents relied mostly on the payback and average return on investment methodologies. Discounted cash flows were used more often for tactical and strategic decisions (approximately 50 percent) than for investment replacements (approximately 25 percent). The

least often cited method of evaluating each type of project was the net present value.

Millar and Sullenberger found that only 12.7 percent of the Arkansas manufacturers responding to a survey (22 of 173) used either the net present value or internal rate of return as the primary method for evaluating proposed capital investment projects.[8] A slightly higher 18.9 percent (17 of 90 respondents) indicated these to be secondary methods for project evaluation. The Millar and Sullenberger study classified firms as "small" (10-49 employees), "medium" (50-200 employees), and "large" (over 200 employees).

Purpose and Methodology

Consistent with the Millar and Sullenberger study, this study also classifies Arkansas manufacturers as small, medium, and large so as to identify any changes in capital budgeting "policies" and the use of the different capital budgeting methodologies over the ensuing 13 years. This study further examines the use of capital budgeting techniques within the context of the size of the capital budget. Capital budgets of the respondents are classified as "small" (less than $250,000), "medium" ($250,000 to $1,000,000), "large" ($1,000,000 or more), and "not reported" (respondents did not indicate size of capital budget).

The sample was randomly drawn from a listing of Arkansas manufacturers.[9] While this sample is drawn from a narrowly defined geographical region, several industries are represented and we know of no particular regional bias that is inherent in responses to these questions. However, to the extent that geographic regional biases do exist in the use of capital budgeting techniques, our results have limited generalizability.

Ninety-four (11 percent) of the mailed surveys were returned. Industry representation of the respondents is shown in Table 1. The responses are diversified across 19 industries and include (by employment size) 34 small firms, 27 medium firms and 33 large firms.

Changes Over Time — The Effect of Firm Size

The Millar and Sullenberger study of 173 Arkansas manufacturers reflected a mix of 31.2 percent small firms, 29.5 percent medium firms, and 39.3 percent large firms. Using the same classifications (number of employees), the 94 firms examined by this study reflect a mix of 36.2 percent small, 28.7 percent medium, and 35.1 percent large. The comparability of the "firm mixes" of the two studies reduces the possibility of firm size bias when comparing aggregated responses of the two studies.

Capital Budgeting Policies

With respect to capital budgeting policies, Table 2 summarizes responses to the three questions asked by both surveys. The results indicate little change over the 13 year period. Roughly 76 percent of the firms have prescribed capital budgeting policies. Of these firms, 74-78 percent have these policies in written form. Similarly, both surveys indicated post audit requirements for about 70 percent of the firms.

This study additionally asked survey respondents whether there were constraints placed on the size of their capital budgets and the type of investment decisions for which capital budgeting methodologies are used. Results are shown in Tables 3 and 4, respectively. Due to multiple responses and non-responses, the number of responses will not equal the

Table 1

Respondents by Size and Industrial Classification

SIC	Industry Description	Firm Size			Total	Percent Return
		Small	Medium	Large		
20	Food and Kindred Projects	2	5	5	12	22.2
22	Textile Mill Products	0	1	1	2	10.5
23	Apparel and Other Finished Products made from Fabrics and Similar Materials	1	0	0	1	01.9
24	Lumber and Wood Products, except Furniture	1	2	1	4	07.1
25	Furniture and Fixtures	3	2	1	6	11.3
26	Paper and Allied Products	2	1	4	7	19.4
27	Printing, Publishing and Allied Industries	6	1	2	9	17.6
28	Chemicals and Allied Products	3	2	1	6	12.5
29	Petroleum Refining and Related Industries	2	2	0	4	11.8
30	Rubber and Miscellaneous Plastics Products	2	0	4	6	11.8
31	Leather and Leather Products	1	0	1	2	07.4
32	Stone, Clay, Glass and Concrete Products	0	1	1	2	04.1
33	Primary Metal Industries	1	4	2	7	14.3
34	Fabricated Metal Products, except Ordnance, Machinery and Transportation Equipment	0	1	0	1	01.8
35	Machinery, except Electrical	3	2	2	7	13.5
36	Electrical and Electronic Machinery, Equipment and Supplies	2	3	4	9	19.6
37	Transportation Equipment	1	0	2	3	06.4
38	Measuring, Analyzing and Controlling Instruments; Photographic, Medical and Optical Goods; Watches and Clocks	2	0	1	3	09.1
39	Miscellaneous Manufacturing Industries	2	0	1	3	07.1
		34	27	33	94	11.0

Table 2

Changes in Capital Budgeting Policies

	Prior Results				Current Results
Does your firm have prescribed policies and procedures for making capital investment (expenditure) decisions?	76.3%	-	Yes	-	75.9%
If yes, are these policies and procedures in written form?	74.4%	-	Yes	-	78.1%
Does your firm perform a post audit of capital expenditures?	69.9%	-	Yes	-	70.4%

94 survey respondents (in total and by firm size).

Over 28 percent of the survey respondents indicated there is no constraint on the size of their capital budgets and that all profitable projects could be accepted (Table 3). The presence of constraints appeared to be influenced by the size of the firm, that is, as the size of the firm increased, the presence of constraints increased. In particular, the constraint "Limit Established by Higher Authority" appeared to vary directly with the size of the firm. Conversely, an inverse relationship appeared to exist between firm size and presence of the constraint "Debt Limit Policy."

There is an inconsistent relationship between firm size and the constraint "Desire to Maintain Dividend Policy or Earnings." The constraint was not cited by small firms, but was more frequently cited by medium size firms than by large firms. This constraint essentially reflected a focus on short term profitability, to the exclusion of possible capital investments that may have a longer term profitability.

One or more capital budgeting methods were used by 71 of the 85 firms (83.5 percent) responding to the question (See Table 4). Of these 71 respondents, 44 (62.0 percent) used capital budgeting techniques for all capital investment decisions. Table 4.1 shows that of the 27 (38.0 percent) that used these techniques for selected capital investment decisions, the dollar value of the decision was the most common selection factor. Not surprisingly, there appeared to be a direct relationship between "dollar threshold" and firm size; i.e., on average the dollar threshold increased with firm size. The numbers in Tables 4 and 4.1 do not correspond exactly because the respondents may have indicated more than one category of selected "Capital Investment Decisions."

Capital Budgeting Methodologies

Capital budgeting methodologies can be grouped into those which consider the time value of money and those which do not. The former are considered more sophisticated and include the internal rate of return and net present value techniques.

Table 3

Constraints on Size of Capital Budget

	Size of Firm							
	Small		Medium		Large		Total	
	Nr	%	Nr	%	Nr	%	Nr	%
No Constraints (all profitable projects can be accepted)	12	37.5	9	31.0	6	17.6	27	28.4
Constraints								
Limit Established by Higher Authority	7	21.9	11	37.9	17	50.0	35	36.8
Debt Limit Policy	10	31.2	4	13.8	3	8.8	17	17.9
Desire to Maintain Dividend Policy or Earnings	0	0.0	4	13.8	2	5.9	6	6.3
Other	3	9.4	1	3.4	6	17.6	10	10.5
	32	100.0	29	100.0	34	100.0	95	100.0

Table 4

Use of Capital Budgeting Methodologies

Capital Budgeting Methodologies:	Size of Firm							
	Small		Medium		Large		Total	
	Nr	%	Nr	%	Nr	%	Nr	%
Not Used	9	31.0	2	8.3	3	9.4	14	16.5
Used for All Capital Investment Decisions	13	44.8	13	54.2	18	56.3	44	51.8
Used for Selected Capital Investment Decisions*	7	24.1	9	37.5	11	34.4	27	31.8
	29	100.0	24	100.0	32	100.0	85	100.0

*See Table 4.1

Table 4.1

Factors in Selected Capital Investment Decisions
From Table 4 – more than one response per firm

	Size of Firm			
	Small	Medium	Large	Total
Over Dollar Threshold	7	6	9	22
> $ 500	1	0	0	1
> $ 1,000	1	0	0	1
> $ 2,000	2	0	1	3
> $ 5,000	1	1	3	5
> $ 10,000	1	3	1	5
> $ 25,000	0	1	2	3
> $ 50,000	1	1	0	2
> $ 75,000	0	0	1	1
> $100,000	0	0	1	1
Environmental	0	1	2	3
Safety	0	1	2	3
Other	0	4	3	7
	7	12	16	35

Those methods which do not consider the time value of money include the payback, average (accrual accounting) rate of return, and profitability index.

Firms were asked to identify the primary method used to evaluate capital investment proposals and any secondary methods used. Table 5 summarizes by firm size the primary and secondary capital budgeting techniques used by Arkansas manufacturers. Results of the Millar and Sullenberger study are presented as "prior", while the results of this study are presented as "current."

For medium and large firms and for total firms, there has been a considerable increase in the use of capital budgeting techniques which consider the time value of money. These increases occur for both the primary and secondary methodologies used for capital investment decisions. The combined primary and secondary use by large firms increased from 27.3 percent (7.3 and 20.0 percent, respectively) to 61.5 percent (31.2 and 30.3 percent). For medium firms this increase was from 26.7 percent (10.0 and 16.7 percent, respectively) to 53.4 percent (30.7 and 22.7 percent) in the use of capital budgeting techniques which consider the time value of money. This increase in the use of the more sophisticated capital budgeting techniques was confined, however, to large and medium firms.

The results of this study indicated a considerable decrease in the small firm use of capital budgeting methodologies which consider the time value of money. While

the Millar and Sullenberger study showed that small firms used the internal rate of return and net present value techniques proportionately more than medium and large firms, this study showed both medium and large firms to be relatively more frequent users of these techniques. The combined primary and secondary use of these capital budgeting methods by small firms decreased from 42.2 percent (22.2 and 20.0 percent, respectively) in 1973 to 18.1 percent (0.0 and 18.1 percent) in the current study. Although the decrease is small with respect to "secondary methods" (20.0 to 18.1 percent), it is most dramatic with respect to "primary methods" (22.2 to 0.0 percent). This study showed no small firm use of these methodologies as the primary method for capital investment decisions. One can only speculate as to the cause of this unexpected result.

The Millar and Sullenberger study obtained responses on only two capital budgeting techniques which did not consider the time value of money, namely, payback and average rate of return. The current study added the profitability index. Because the computation of this index (forecasted project earnings or cost savings divided by estimated investment costs) is so similar to the procedures for computing the average rate of return (*average* project earnings or cost savings divided by investment costs), it is possible that the respondents in the Millar and Sullenberger study included profitability index as a variation of the "average rate of return."

The Effect of Capital Budget Size

Size as measured by employment numbers may not, however, be the most appropriate basis upon which to examine capital budgeting policies and procedures. One may argue that a firm's "commitment" to capital investment may better explain its use of the various capital budgeting techniques. Accordingly, this study also examined capital investment policies and procedures on the basis of the stated size of the capital budget.

Table 6 shows the relationship of capital budget size and firm size (as measured by employment).

As would be expected, small (employment) firms on average had the smallest capital budgets and large (employment) firms, the largest. However, some small employment firms had capital budgets in excess of $1,000,000, and some large employment firms had capital budgets less than $50,000.

For purposes of further discussion, this study will classify capital budget size as:

small - less than $250,000 (28 firms)
medium - $250,000 to $1,000,000 (19 firms)
large - $1,000,000 or more (18 firms)

In order to "reconcile" to the previously presented tables, the following presentations will include the responses of those firms which did not indicate the size of their capital budgets.

As shown in Table 3A, small capital budget firms appear to have fewer constraints upon the size of the capital budget than do large capital budget firms. Nearly 47 percent of firms with small capital budgets stated there was no constraint on capital budget size – that all profitable projects could be accepted. Conversely, only about 9 percent of the firms with large capital budgets indicated an absence of constraints on capital budget size. The most common constraint on capital budget size was "limit established by higher

Table 6

Capital Budget Size and Firm (Employment) Size

Capital Budget Size	Employment Size of Firm			Total
	Small	Medium	Large	
< $ 50,000	10	1	2	13
< $ 100,000	3	4	0	7
< $ 250,000	2	3	3	8
< $ 500,000	2	5	3	10
< $ 1,000,000	2	4	3	9
< $ 5,000,000	2	1	10	13
< $ 25,000,000	1	1	3	5
	22	19	24	65
Did not identify size of capital budget	12	8	9	29
	34	27	33	94

authority." The relative frequency of this constraint increased with the size of the capital budget (18.8 percent, small capital budgets; 35.0 percent, medium capital budgets; 59.1 percent, large capital budgets).

Firms with large capital budgets also were more likely to use capital budgeting methodologies than were firms with small capital budgets (Table 4A). Similarly, these large capital budget firms were more likely to use capital budgeting techniques for all capital investment decisions as opposed to selected decisions.

With respect to the use of capital budgeting methods for selected capital investment decisions, a dollar threshold was the most commonly cited factor for small, medium, and large capital budgets (See Table 4A.1). Although on average the dollar threshold was lowest for small capital budgets, there was considerable overlap among the individual dollar thresholds. Environmental and safety factors were limited to medium and large capital budgets.

Table 5A shows primary and secondary use of capital budgeting methodologies by size of the capital budget. Large capital budgets were more likely to be supported by capital budgeting methods which consider the time value of money than are either medium or small capital budgets. This relationship was less pronounced if one compared only medium and small capital budgets. In the aggregate, the combined primary and secondary use of the internal rate of return and net present value techniques was 64.8 percent (30.0 and 34.8 percent, respectively) for large capital budgets, 39.3 percent (25.0 and 14.3 percent) for medium capital budgets, and 28.9 percent (11.5 and 17.4 percent) for small capital budgets.

Sixty of the 65 Arkansas firms which identified the size of their capital budgets indicated a capital budget of less than $5,000,000. This size was consistent with

Table 5

Primary and Secondary Capital Budgeting Methodologies
(amounts shown as percent of total)

	Size of Firm							
	Small		Medium		Large		Total	
	Prior	Current	Prior	Current	Prior	Current	Prior	Current
Primary Method								
internal rate of return	5.6	0.0	2.0	19.2	2.9	15.6	3.5	11.8
net present value	16.7	0.0	8.0	11.5	4.4	15.6	9.2	9.4
	22.2	0.0	10.0	30.7	7.3	31.2	12.7	21.2
payback	50.0	55.6	72.0	34.6	63.8	28.1	61.8	38.8
average rate of return	20.4	0.0	8.0	11.5	24.5	15.6	18.6	9.4
profitability index*	**	33.3	**	23.1	**	15.6	**	23.5
	70.4	88.9	80.0	69.2	88.3	59.3	80.4	71.7
other	7.3	11.1	10.0	0.0	4.4	9.4	6.9	7.1
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Secondary Method(s)								
internal rate of return	15.0	13.6	6.7	13.6	5.0	9.1	7.8	11.7
net present value	5.0	4.5	10.0	9.1	15.0	21.2	11.1	13.0
	20.0	18.1	16.7	22.7	20.0	30.3	18.9	24.7
payback	30.0	27.3	20.0	31.8	32.5	33.3	27.8	31.2
average rate of return	35.0	31.8	43.3	27.3	37.5	21.2	38.9	26.0
profitability index*	**	22.7	**	18.2	**	9.1	**	15.6
	65.0	81.8	63.3	77.3	70.0	63.3	66.7	72.8
other	15.0	0.0	20.0	0.0	10.0	6.1	14.4	2.6
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

*Project earnings or cost savings investment costs.
**Not separately listed by Millar and Sullenberger.

Table 3A

Constraints on Size of Capital Budget

	Size of Capital Budget									
	Not Reported		Small (< $250,000)		Medium (< $1,000,000)		Large (< $25,000,000)		Total	
	Nr	%	Nr	%	Nr	%	Nr	%	Nr	%
No Constraint (All Profitable Projects Can be Accepted)	3	14.3	15	46.9	7	35.0	2	9.1	27	28.4
Constraints										
Limit Established by Higher Authority	9	42.9	6	18.8	7	35.0	13	59.1	35	36.8
Debt Limit Policy	5	23.8	6	18.8	3	15.0	3	13.6	17	17.9
Desire to Maintain Dividend Policy or Earnings	0	0.0	2	6.2	1	5.0	3	13.6	6	6.3
Other	4	19.0	3	9.4	2	10.0	1	4.5	10	10.5
	21	100.0	32	100.0	20	100.0	22	100.0	95	100.0

the definition of "moderate" size used by Viscione and Neuhaser.[10] Their study of moderately sized firms indicated results comparable to those of this study. For routine replacement decisions, they found that relatively few firms used discounted cash flow techniques. Instead, these moderately sized firms relied on the payback and average return on investment methodologies. The least cited methodology in their study was the net present value.

The results of this study are quite similar to those reported by Viscione and Neuhaser. Only 21.2 percent of the responses indicated the use of discounted cash flow techniques as the primary basis for evaluating capital investment projects. Another 24.7 percent indicated the use of these techniques as a secondary basis of evaluation. In other words, the less sophisticated methodologies (those that ignore the time value of money) were used as a primary or secondary basis of evaluation by 78.8 percent and 75.3 percent of the respondents, respectively.

As previously noted in Table 6, firms with small employment on average had the smallest capital budgets and the large employment firms on average had the largest capital budgets. There was, however, some migration of firms among the different classifications. This migration is summarized in Table 6A.

This limited migration implies that the employment size and capital budget size classifications of respondents would reflect comparable use of the various capital budgeting techniques. For the most part, the results of this study did reflect such comparable results.

Table 7 presents the relative use of discounted cash flow techniques by survey respondents, as classified by firm employment size and capital budget size (see Tables 5 and 5A for details). With possibly two exceptions, the use of these capital budgeting techniques was comparable for the small, medium, and large classifications of both employment size and capital budget size.

The "small firm" classification (by employment size) reflected a 0.0 percent primary use of discounted cash flow methods as opposed to 11.5 percent (by capital budget size). The second exception was the secondary use of these methods by "medium firms." The employment size classification reflected a 22.7 percent

Table 6A

Migration of Firms

Capital Budget Size	Employment Size			
	Small	Medium	Large	Total
Small	15 firms	8 firms	5 firms	28 firms
Medium	4	9	6	19
Large	3	2	13	18
Not Reported	12	8	9	29
Total	34	27	33	94

Table 7

Relative Use of Discounted Cash Flow Methodologies

	Primary	Secondary
Small Firms		
Employment	0.0%	18.1%
Capital Budget	11.5%	17.4%
Medium Firms		
Employment	30.7%	22.7%
Capital Budget	25.0%	14.3%
Large Firms		
Employment	31.2%	30.3%
Capital Budget	30.0%	34.8%

secondary use relative to 14.3 percent by capital budget size. Differences in relative use could at least partially be explained by (1) the migration of firms among the small, medium and large classifications of employment size and capital budget size and (2) the fact that nearly 31 percent (29 of 94) of the responding firms did not indicate the size of their capital budgets.

Summary and Conclusions

In the 13 years since the Millar and Sullenberger study of Arkansas manufacturers, there has been a relative increase in the overall use of capital budgeting methodologies which consider the time value of money. Use of these methodologies as the primary means of evaluating capital investment alternatives increased from 12.7 percent to 21.2 percent of total firms surveyed. As a secondary method, their use increased from 18.9 percent to 24.7 percent. Overall (summing primary and secondary use) there was an increase in the use of the internal rate of return and net present value techniques from 31.6 percent in the 1974 study to 45.9 percent in the current study.

This overall increase, however, masks what may be the most important finding of this study. Although small firms (those with less than 50 employees) in 1974 showed the largest percent usage of these sophisticated capital budgeting techniques (42.2 percent primary and secondary usage), in the current study small firms reported only an 18.1 percent usage. Most remarkable is that the current study indicated nonuse (0.0 percent) of these methodologies as the primary capital budgeting technique.

Capital budget size also appears to exert some influence on the use of the various capital budgeting methodologies. The use of methods which consider the time value

of money is more prevalent with large capital budgets (an "aggregate" of 64.8 percent) than with smaller capital budgets (an "aggregate" of 28.9 percent).

The results of this study indicate much less use of sophisticated capital budgeting techniques than had been found in most other studies. Those studies, however, were national or international in scope and examined firms which were much larger on average than the Arkansas manufacturers examined by this study. The results of this study are, however, consistent with those found in prior research of medium sized firms.

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[5]J. S. Moore and A. K. Reichert, "An Analysis of the Financial Management Techniques Currently Employed by Large U. S. Corporations," *Journal of Business Finance and Accounting*, Winter 1983, Vol. 10, No. 4, pp. 623-645.

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[8]J. A. Millar and A. G. Sullenberger, "An Empirical Study of the Use of Alternative Methods of Evaluating Capital Expenditures by Arkansas Manufacturers," *Arkansas Business and Economic Review*, Spring 1974, pp. 1-10.

[9]Arkansas Industrial Development Foundation, *Directory of Arkansas Manufacturers*, 1984 Edition (Little Rock: Arkansas Industrial Development Foundation, 1984).

[10]Viscione and Neuhaser, "Capital Expenditure," pp. 16-23.

Selected Arkansas and U.S. Economic Indicators

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The Arkansas Economy - Good Things and Bad Things

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As is normal, the standard economic indicators reveal both good things and not so good things about the Arkansas economy.

Among the good things was the continued decline in the seasonally adjusted unemployment rate which fell from 8.2% in March of 1988, to 6.8% in February of 1989. But the unemployment rate of Arkansas continued to be above the nation's rate which, during the same period, fell from 5.5% to 5.1%. Even so and although the unemployment rate in Arkansas in March exceeded the January rate of 6.2%, the overall improvement over the past year should be viewed as positive.

Within the state, there continued to be a wide disparity in unemployment rates, ranging from 3.6% (not seasonally adjusted) in Benton County to 19.3% in St. Francis County. Among the Metropolitan Statistical Areas, Fayetteville-Springdale had the lowest rate (3.8%), followed by Little Rock-North Little Rock (6.2%), Fort Smith (7.9%), and Pine Bluff (8.2%).

When compared to statistics from other states in the Eighth Federal Reserve District*, the Arkansas record of economic performance is mixed. Between the third and fourth quarters of 1988, Manufacturing employment in Arkansas grew at an annual rate of 5.4% while the District grew at a 2.2% rate. Payroll employment grew by 5.4% in Arkansas, and by 3.3% in the District. However, between the second and third quarters of 1988, real personal income in Arkansas had zero growth compared to 0.6% in the District, and 2.7% in the United States.

Industrial Production grew in Arkansas during each quarter of 1988, though at rates below those of the United States, and Value Added by Manufacture increased at a rate that was slightly ahead of the inflation rate.

Both Residential and Nonresidential construction continued to decline as they have every year since 1984. Nonresidential showed the greatest decline in 1988, falling 21% below the 1987 level. The decline in residential construction was only 7%.

The agricultural sector of the state continued to show overall improvement in 1988. Cash Receipts from Farm Marketings grew by 23.5% over the 1987 level; moreover, the growth rate of Arkansas was greater than the U.S. rate for three of the four quarters.

Like Arkansas, there are both good and bad things to be seen in the national economy. Both the unemployment rate and inflation rate remain low by the historical standards of the 1980's. However, many economists feel that an unemployment rate of less than 6% cannot be sustained without an acceleration of the inflation rate. The Federal Reserve appears to be following of policy of slow, steady monetary growth that is consistent with low

rates of inflation. It appears, then, that some increase in the unemployment rate can be expected. This does not necessarily mean that a major recession is imminent, only a slower real rate of economic growth.

The issue of the federal deficit has yet to be addressed, and many economists contend that the current administration's budget forecast is based on overly optimistic assumptions about economic growth and interest rates. However, the Net Federal Debt as a percent of Gross National Product stabilized during the past two fiscal years. After growing from 29% of GNP in 1982 to 41.5% in 1986, the debt increased to only 42.9% in fiscal year 1988.

The diagnosis of the economies of both Arkansas and the United States may be likened to that of an individual who is basically healthy, but suffers from some chronic ailments. The chronic ailments are not immediately life-threatening, but should be brought under control if good health is to continue in the long run.

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*Arkansas, and parts of Kentucky, Missouri, Tennessee, Illinois, Indiana, and Mississippi.

Table 4A

Use of Capital Budgeting Methodologies

	Size of Capital Budget								Total	
	Not Reported		Small (< $250,000)		Medium (< $1,000,000)		Large (< $25,000,000)			
	Nr	%	Nr	%	Nr	%	Nr	%	Nr	%
Capital Budgeting Methodologies:										
Not Used	5	25.0	6	21.4	3	15.8	0	0.0	14	16.5
Used for All Capital Investment Decisions	11	55.0	13	46.4	8	42.1	12	66.7	44	51.8
Used for Selected Capital Investment Decisions*	4	20.0	9	32.2	8	42.1	6	33.3	27	31.8
	20	100.0	28	100.0	19	100.0	18	100.0	85	100.0

*See Table 4A.1

Table 4A.1

Factors in Selected Capital Investment Decisions
From Table 4A — more than one response per firm

	Size Not Reported	Size of Capital Budget: Small (< $250,000)	Medium (< $1,000,000)	Large (< $25,000,000)	Total Reported
Over Dollar Threshold	4	6	8	4	22
> $ 500	1	0	0	0	1
> $ 1,000	0	0	1	0	1
> $ 2,000	0	2	0	1	3
> $ 5,000	0	2	2	1	5
> $ 10,000	1	1	3	0	5
> $ 25,000	1	1	1	0	3
> $ 50,000	0	0	1	1	2
> $ 75,000	1	0	0	0	1
> $ 100,000	0	0	0	1	1
Environmental	0	0	2	1	3
Safety	0	0	2	1	3
Other	0	3	1	3	7
	4	9	13	9	35

Table 5A

Primary and Secondary Capital Budgeting Methodologies

	Size of Capital Budget									
	Not Reported		Small (< $250,000)		Medium (< $1,000,000)		Large (< $25,000,000)		Total	
	Nr	%	Nr	%	Nr	%	Nr	%	Nr	%
Primary Method										
internal rate of return	3	15.8	3	11.5	1	5.0	3	15.0	10	11.8
net present value	1	5.3	0	0.0	4	20.0	3	15.0	8	9.4
	4	21.1	2	11.5	5	25.0	6	30.0	18	21.2
payback	6	31.6	12	46.2	8	40.0	7	35.0	33	38.8
average rate of return	2	10.5	0	0.0	1	5.0	5	25.0	8	9.4
profitability index	7	36.8	7	26.9	5	25.0	1	5.0	20	23.5
	15	78.9	19	73.1	14	70.0	13	65.0	61	71.8
other	0	0.0	4	15.4	1	5.0	1	5.0	6	7.0
	19	100.0	26	100.0	20	100.0	20	100.0	85	100.0
Secondary Methods										
internal rate of return	3	17.6	2	8.7	1	7.1	3	13.0	9	11.7
net present value	2	11.8	2	8.7	1	7.1	5	21.7	10	13.0
	5	29.4	4	17.4	2	14.3	8	34.8	19	24.7
payback	7	41.2	7	30.4	5	35.7	5	21.7	24	31.2
average rate of return	3	17.6	5	21.7	5	35.7	7	30.4	20	26.0
profitability index	2	11.8	6	26.1	2	14.3	2	8.7	12	15.6
	12	70.6	18	78.3	12	85.7	14	60.9	56	72.7
other	0	0.0	1	4.3	0	0.0	1	4.3	2	2.6
	17	100.0	23	100.0	14	100.0	23	100.0	77	100.0

Labor Force and Employment

Arkansas

(Seasonally adjusted)

Year	Month	Civilian Labor Force (Units)	Total Employment (Units)	Agricultural Employment (Units)	Manufacturing Wage and Salary Employment (Units)	Unemployment Rate* (Percent)
1982		1,025,000	924,000	64,000	195,000	9.8
1983		1,028,000	924,000	63,000	200,000	10.1
1984		1,041,000	948,000	62,000	210,000	8.9
1985		1,052,000	961,000	46,000	210,000	8.7
1986		1,072,000	978,000	45,000	214,000	8.8
1987		1,091,000	1,002,000	45,000	220,000	8.2
1988		1,123,000	1,037,000	44,000	228,000	7.6
	Mar.	1,133,924	1,041,155	44,624	227,128	8.2
	Apr.	1,122,594	1,031,884	44,471	226,458	8.1
	May	1,110,787	1,018,829	44,224	225,772	8.3
	Jun.	1,099,256	1,016,089	44,071	228,441	7.6
	Jul.	1,114,926	1,031,223	43,906	228,995	7.6
	Aug.	1,105,782	1,019,413	43,852	229,276	7.8
	Sep.	1,108,688	1,026,826	43,786	229,182	7.3
	Oct.	1,129,339	1,048,186	43,766	230,400	7.0
	Nov.	1,135,080	1,056,275	43,708	231,535	6.8
	Dec.	1,143,772	1,063,920	43,821	232,561	6.8
1989						
	Jan.	1,148,227	1,079,111	27,330	234,339	6.2
	Feb.	1,142,141	1,064,460	25,194	234,097	6.8

*The seasonally adjusted unemployment rate is calculated by the ratio of adjusted unemployment divided by adjusted civilian labor force. This result is different from the calculation [(1 - (adjusted employment divided by adjusted civilian labor force)].

Note: Beginning with estimates for January 1989, the Bureau of Labor Statistics implemented a new method of calculating employment and unemployment at the Statewide level. Labor force data for the State have been revised back to 1978 using the new estimating methodology.

ARKANSAS LABOR FORCE ESTIMATES
March 1989, Not Seasonally Adjusted

Area	Civilian Labor Force	Unemployment Rate	Total Employment
UNITED STATES	122,222,000	5.2	115,844,000
STATE OF ARKANSAS	1,146,200	7.5	1,059,800
Fayetteville-Springdale MSA	63,125	3.8	60,750
Fort Smith MSA	92,450	7.9	85,175
Little Rock-North Little Rock MSA	271,650	6.2	254,900
Pine Bluff MSA	38,475	8.2	35,325

County	Civilian Labor Force	Unemployment Rate	Total Employment	County	Civilian Labor Force	Unemployment Rate	Total Employment
Arkansas	10,750	5.3	10,175	Lee	4,450	16.9	3,700
Ashley	11,375	8.6	10,400	Lincoln	4,575	9.3	4,150
Baxter	11,550	6.9	10,750	Little River	5,425	7.4	5,025
Benton	53,725	3.6	51,775	Logan	9,875	8.1	9,075
Boone	15,650	5.8	14,750	Lonoke	18,500	8.6	16,900
Bradley	4,925	12.2	4,325	Madison	5,125	7.8	4,725
Calhoun	5,425	4.1	5,200	Marion	6,400	5.9	6,025
Carroll	10,150	9.6	9,175	Miller	17,950	7.2	16,650
Chicot	6,000	13.8	5,175	Mississippi	22,625	14.1	19,425
Clark	9,500	6.8	8,850	Monroe	5,150	8.7	4,700
Clay	9,150	7.9	8,425	Montgomery	2,800	8.9	2,550
Cleburne	8,375	9.3	7,600	Nevada	4,475	12.8	3,900
Cleveland	3,875	6.5	3,625	Newton	3,050	8.2	2,800
Columbia	13,200	6.8	12,300	Ouachita	14,225	9.3	12,900
Conway	8,150	8.0	7,500	Perry	4,625	7.6	4,275
Craighead	37,400	5.3	35,425	Phillips	10,025	13.7	8,650
Crawford	21,350	8.1	19,625	Pike	4,650	10.2	4,175
Crittenden	24,300	9.7	21,950	Poinsett	11,275	12.2	9,900
Cross	8,550	10.8	7,625	Polk	6,800	6.3	6,375
Dallas	4,450	7.9	4,100	Pope	25,100	5.3	23,775
Desha	7,300	10.6	6,525	Prairie	4,750	10.5	4,250
Drew	8,400	10.7	7,500	Pulaski	194,400	5.6	183,425
Faulkner	27,950	8.1	25,675	Randolph	7,250	9.7	6,550
Franklin	6,375	16.1	5,350	St. Francis	10,475	19.3	8,450
Fulton	3,900	8.3	3,575	Saline	30,800	6.2	28,900
Garland	32,700	6.9	30,450	Scott	5,750	5.7	5,425
Grant	6,800	6.3	6,375	Searcy	3,275	8.4	3,000
Greene	14,900	7.6	13,775	Sebastian	54,500	7.8	50,275
Hempstead	10,175	8.4	9,325	Sevier	6,600	6.4	6,175
Hot Spring	10,800	11.6	9,550	Sharp	6,175	7.3	5,725
Howard	6,250	5.2	5,925	Stone	4,100	9.1	3,725
Independence	16,475	7.9	15,175	Union	21,775	8.2	20,000
Izard	5,400	5.1	5,125	Van Buren	6,025	7.9	5,550
Jackson	8,900	14.9	7,575	Washington	63,125	3.8	60,750
Jefferson	38,475	8.2	35,325	White	25,125	10.6	22,450
Johnson	7,350	9.2	6,675	Woodruff	4,375	16.6	3,650
Lafayette	3,275	10.7	2,925	Yell	8,975	5.0	8,525
Lawrence	8,350	7.5	7,725				

Source: Labor Market Information Section, Arkansas Employment Security Division, April 1989.

Labor Force Estimates
March 1989

In March, Arkansas' Civilian Labor Force grew 11,700 to total 1,146,200. Total Employment grew 18,400 to total 1,059,800. Hence, Unemployment fell 6,700 to total 86,400. Of the 75 counties, Benton had the lowest unemployment rate, 3.6 percent, and St. Francis, the highest, 19.3 percent. Twenty-six counties had unemployment rates equal to or below the state rate, 7.5 percent, but nineteen others had rates above 10 percent. Of the MSAs, Fayetteville-Springdale had the lowest unemployment rate, 3.8 percent, and Pine Bluff, the highest, 8.2 percent. The unemployment rates for the Little Rock-North Little Rock and Fort Smith MSAs were 6.2 and 7.9 percent, respectively.

Boundary lines of counties having an unemployment rate less than or equal to the national average of 5.2 percent.

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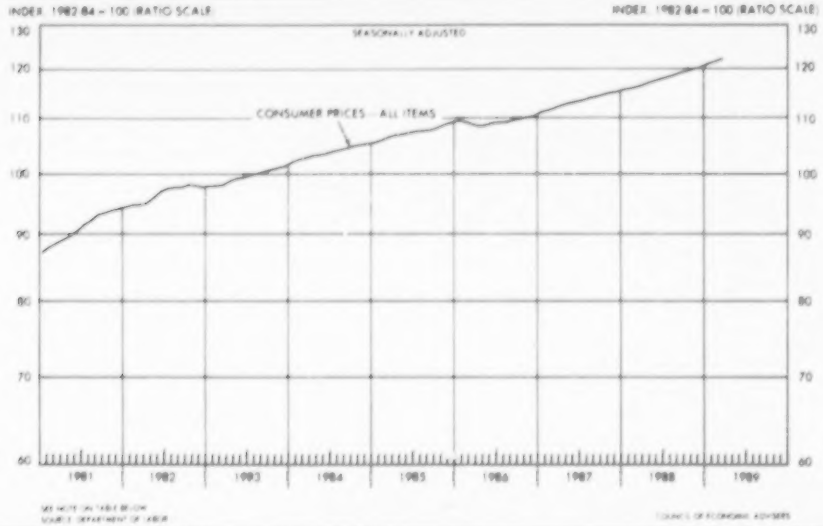
CONSUMER PRICES—ALL URBAN CONSUMERS

In March, the consumer price index for all urban consumers rose 0.5 percent, seasonally adjusted (0.6 percent not seasonally adjusted). The index was 5.0 percent above its year-earlier level.



(1982-84 = 100, except as noted; monthly data seasonally adjusted, except as noted)

Period	All items [1]		Food	Housing						Apparel and upkeep	Transportation			Medical care	Energy [2]	All items less food, shelter and energy
				Total [1]	Shelter			Maintenance and repairs (NSA)	Fuel and other utilities		Total [1]	New cars	Motor fuel			
	Not seasonally adjusted (NSA)	Seasonally adjusted			Total	Rent of shelter (Dec 1982 = 100)	Home ownership costs (Dec 1982 = 100)									
Rel. imp. [3]	100.0		16.2	42.3	27.8	7.9	19.7	0.2	7.6	6.4	17.2	4.3	3.1	6.0	7.3	48.7
1980	82.4		86.8	81.1	81.0			87.4	75.4	90.9	83.1	88.4	97.4	74.9	86.0	80.6
1981	90.9		93.6	90.4	90.5			90.7	86.4	95.3	93.2	93.7	108.5	82.9	97.7	88.3
1982	96.5		97.4	96.9	96.9			96.4	94.9	97.8	97.0	97.4	102.8	92.5	99.2	95.1
1983	99.6		99.4	99.5	99.1	103.0	102.5	99.9	100.2	100.2	99.3	99.9	99.4	100.6	99.9	100.0
1984	103.9		103.2	103.6	104.0	108.6	107.3	103.7	104.8	102.1	103.7	102.8	97.9	108.8	100.9	105.0
1985	107.6		105.6	107.7	109.8	115.4	113.1	106.5	106.5	105.0	106.4	106.1	98.7	113.5	101.6	109.0
1986	109.6		109.0	110.9	115.8	121.9	119.4	107.9	104.1	105.9	102.3	110.6	77.1	122.0	88.2	112.7
1987	113.6		113.5	114.2	121.3	128.1	124.8	111.8	103.0	110.6	105.4	114.6	80.2	130.1	88.6	117.0
1988	118.3		118.2	118.5	127.1	133.6	131.1	114.7	104.4	115.4	108.7	116.9	80.9	138.6	89.3	121.9
1988																
Mar	116.5	116.7	116.0	117.2	125.5	132.6	129.3	113.3	103.6	114.1	107.2	116.1	79.5	138.1	87.9	120.4
Apr	117.1	117.2	116.6	117.6	125.8	132.3	129.8	115.3	104.0	115.5	107.5	116.2	80.1	136.8	88.4	121.0
May	117.5	117.7	117.1	117.9	126.2	132.6	130.3	114.3	104.0	116.3	108.2	116.5	81.4	137.6	88.9	121.5
June	118.0	118.1	117.8	118.2	126.7	133.0	130.8	114.7	103.9	115.9	108.4	116.6	80.9	138.4	88.7	121.8
July	118.5	118.6	118.9	118.5	127.0	133.4	131.2	114.5	104.0	115.7	108.7	116.7	81.3	139.4	88.9	122.2
Aug	119.0	119.0	119.5	118.9	127.6	133.8	131.9	115.0	104.0	113.9	109.6	117.0	82.8	140.0	89.5	122.4
Sept	119.8	119.5	120.3	119.3	128.1	133.8	132.5	115.3	104.4	116.0	109.7	117.7	82.0	140.7	89.3	123.0
Oct	120.2	120.0	120.6	119.6	128.3	134.1	132.7	115.0	105.1	117.4	110.1	117.8	81.3	141.6	89.2	123.8
Nov	120.3	120.3	120.8	120.1	128.9	134.2	133.5	115.4	105.5	117.4	110.4	117.9	81.1	142.2	89.5	124.2
Dec	120.5	120.7	121.2	120.6	129.4	134.9	133.9	115.8	106.3	117.7	110.4	118.1	79.7	142.9	89.2	124.6
1989																
Jan	121.1	121.4	122.1	120.9	129.7	135.2	134.2	116.1	106.9	117.7	111.2	118.9	80.5	144.0	89.9	125.4
Feb	121.6	121.9	122.6	121.3	130.3	136.4	134.7	117.1	106.7	117.5	111.9	119.3	81.8	145.2	90.4	125.8
Mar	122.3	122.5	123.6	121.7	131.1	138.2	135.1	117.1	106.9	119.1	112.6	119.7	83.6	145.9	91.4	126.3

[1] Includes items not shown separately.
[2] Household fuels—gas (piped), electricity, fuel oil, etc.—and motor fuel. Motor oil, coolant, etc. also included through 1982.
[3] Relative importance, December 1988.

Note.—Data beginning 1983 incorporate a rental equivalence measure for homeowners' costs and therefore are not strictly comparable with figures for earlier periods. Data beginning 1987 and 1988 calculated on a revised basis.

Source: Department of Labor, Bureau of Labor Statistics.

Personal Income

Quarterly Changes in Personal Income, Arkansas and United States

(Seasonally adjusted, Percent)

	1987 Q-II thru 1987 Q-III	1987 Q-III thru 1987 Q-IV	1987 Q-IV thru 1988 Q-I	1988 Q-I thru 1988 Q-II	1988 Q-II thru 1988 Q-III	1988 Q-III thru 1988 Q-IV
Arkansas	+ 0.6	+ 1.7	+ 1.0	+ 5.7	- 0.8	+ 1.5
United States	+ 1.7	+ 2.8	+ 1.1	+ 1.8	+ 1.8	+ 2.1

Personal Income in Arkansas

(Seasonally adjusted, annual rate, Millions of dollars)

	1981	1982	1983	1984	1985	1986	1987	1988
Quarter								
Jan-Mar	18,648	19,432	20,729	23,410	25,141[R]	26,143[R]	27,289[R]	28,280[R]
Apr-Jun	19,088	19,766	21,134	22,922	24,591[R]	25,886[R]	27,384[R]	29,900[R]
Jul-Sep	19,534	19,817	20,898	23,258	24,619[R]	26,232[R]	27,545[R]	29,646[R]
Oct-Dec	19,290	20,406	21,871	23,646	25,001[R]	26,513[R]	28,002[R]	30,087
Annual	19,140	19,855	21,158	23,309	24,838[R]	26,194[R]	27,555[R]	29,478

[R]Revised

Industrial Production

Quarterly Changes in Industrial Production Arkansas and United States

(Seasonally adjusted, Percent)

	1987 Q-III thru 1987 Q-IV	1987 Q-IV thru 1988 Q-I	1988 Q-I thru 1988 Q-II	1988 Q-II thru 1988 Q-III	1988 Q-III thru 1988 Q-IV
Arkansas	+ 1.6	+ 0.9	+ 0.8	+ 1.8	+ 0.3
United States	+ 1.7	+ 1.0	+ 1.1	+ 1.7	+ 1.0

Value Added by Manufacture in Arkansas

(Seasonally adjusted, annual rate, Millions of dollars)

	1981	1982	1983	1984	1985	1986	1987	1988
Quarter								
Jan-Mar	7,165.1[R]	7,471.3[R]	7,890.8[R]	8,834.0[R]	9,291.5[R]	9,514.4[R]	10,085.7[R]	10,790.0[R]
Apr-Jun	7,387.6[R]	7,569.1[R]	8,139.2[R]	8,959.1[R]	9,282.5[R]	9,646.7[R]	10,281.7[R]	10,880.7[R]
Jul-Sep	7,605.7[R]	7,591.8[R]	8,409.8[R]	9,077.7[R]	9,353.2[R]	9,763.0[R]	10,525.2[R]	11,075.1[R]
Oct-Dec	7,588.2[R]	7,745.8[R]	8,513.5[R]	9,154.2[R]	9,397.0[R]	9,979.1[R]	10,698.0[R]	11,110.4[R]
Annual	7,436.6[R]	7,594.5[R]	8,238.3[R]	9,006.2[R]	9,331.0[R]	9,725.8[R]	10,397.6[R]	11,044.2[R]

RRevised

Cash Receipts from Farm Marketings

Quarterly Changes in Cash Receipts, Arkansas and United States

(Seasonally adjusted, Percent)

	1987 Q-II thru 1987 Q-III	1987 Q-III thru 1987 Q-IV	1987 Q-IV thru 1988 Q-I	1988 Q-I thru 1988 Q-II	1988 Q-II thru 1988 Q-III	1988 Q-III thru 1988 Q-IV
Arkansas	- 2.1	- 1.6	+ 6.5	+ 17.9	+6.9	-3.6
United States	+ 3.9	+ 2.8	- 4.1	+ 9.2	- 0.8	- 9.1

Cash Receipts from Farm Marketings in Arkansas

(Seasonally adjusted, annual rate, Thousands of dollars)

	1981	1982	1983	1984	1985	1986	1987	1988
Quarter								
Jan-Mar	3,024,175[R]	3,400,326[R]	2,744,013[R]	3,528,609[R]	3,382,587[R]	3,113,768[R]	3,006,932[R]	3,339,682[R]
Apr-Jun	3,613,127[R]	3,522,930[R]	2,454,500[R]	3,845,453[R]	3,204,040[R]	2,852,086[R]	3,256,039[R]	3,937,162[R]
Jul-Sep	3,725,390[R]	2,777,057[R]	3,055,505[R]	3,284,475[R]	3,112,267[R]	3,265,312[R]	3,186,936[R]	4,206,962[R]
Oct-Dec	3,203,364[R]	3,316,453[R]	3,088,800[R]	3,244,745[R]	3,467,782[R]	2,881,369[R]	3,136,686[R]	4,056,776[R]
Annual	3,391,514[R]	3,254,192[R]	2,835,705[R]	3,475,821[R]	3,291,669[R]	3,028,134[R]	3,146,648[R]	3,885,145[R]

[R]Revised

Waterborne Commerce:
McClellan-Kerr Arkansas River Navigation System

Quarterly Changes in Total and Internal Tonnages

(Seasonally adjusted, Percent)

	1987 Q-III thru 1987 Q-IV	1987 Q-IV thru 1988 Q-I	1988 Q-I thru 1988 Q-II	1988 Q-II thru 1988 Q-III	1988 Q-III thru 1988 Q-IV	1988 Q-IV thru 1989 Q-I
Total	+ 5.9	- 1.2	- 14.7	- 3.5	+ 2.2	+ 12.4
Internal	+22.4	- 26.8	+ 2.5	+ 3.1	- 28.2	+ 2.7

Freight Traffic

(Seasonally adjusted, annual rate, Thousands of short tons)

Time Period		Traffic Tonnages			
		Inbound	Outbound	Internal	Total[1]
1980		1,611	4,643	2,408	9,133
1981		1,564	5,684	1,741	9,446
1982		1,520	4,611	1,561	8,258
1983		1,918	3,905	1,904	8,017
1984		2,128	4,264	2,433	9,490
1985		2,103	3,191	2,521	8,335
1986		2,608	3,453	2,962	9,703
1987		2,131	3,348	2,752	8,885
1988		2,087	3,087	2,107	7,788
	Apr-Jun	1,854	2,757	2,225	7,568
	Jul-Sep	1,858	2,619	2,293	7,302
	Oct-Dec	2,117	3,545	1,646	7,463
1989					
	Jan-Mar	2,005	3,838	1,691	8,390

[1]Total tonnage includes "through traffic."

Arkansas Construction Contracts

Residential Construction Contracts

(Seasonally adjusted, annual rate, Thousands of dollars)

	1981	1982	1983	1984	1985	1986	1987	1988
Quarter								
Jan-Mar	717,612	476,187	831,974	969,402	770,219	842,884	652,950	600,875
Apr-Jun	649,981	603,575	924,270	975,481	784,590	651,928	632,556	549,200
Jul-Sep	554,668	700,788	930,843	930,327	705,496	763,760	647,747	601,860
Oct-Dec	609,014	811,514	933,212	797,304	801,647	701,708	661,759	661,353
Annual	632,818	648,016	905,075	918,128	765,488	742,570	648,753	603,322

Nonresidential Construction Contracts

(Seasonally adjusted, annual rate, Thousands of dollars)

	1981	1982	1983	1984	1985	1986	1987	1988
Quarter								
Jan-Mar	363,356	389,417	286,833	461,592	386,837	476,516	400,391	392,002
Apr-Jun	279,378	212,698	359,775	444,186	411,369	328,485	483,757	294,073
Jul-Sep	252,037	306,050	370,032	507,932	454,883	541,870	420,714	260,301
Oct-Dec	307,569	213,596	449,173	450,036	562,806	311,998	323,122	338,541
Annual	300,585	280,440	366,453	465,937	453,974	414,717	406,996	321,229

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Arkansas Economic Perspectives: Arkansas Per Capita Personal Income and Population in the 1980's

College of Business Administration

University of Arkansas
Fayetteville

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Each manuscript should be double-spaced and submitted in triplicate. The length of the article should not exceed 20 pages including tables, appendices and references. Each chart or table should be camera ready, that is, an original on a separate page. References are to be listed on a separate page at the end of the submitted article and are to be numbered sequentially in order of textual citation with a corresponding superscript at the point of reference. The listing will be used as "Endnotes" to the published article and should be in footnote format.

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Manufacturing or Retirement: A Comparison of the Direct Economic Effects of Two Growth Options

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New Economic Realities

Some nonmetropolitan American communities are taking a second look at retirement as a strategy for economic development. Retirees have long been attracted to such states as Florida, Arizona, and California, but these retirees have been widely believed to have contributed little to their new community's employment levels and its economic base. Retirees, it was argued, require expensive health and welfare services that place a tax burden on the nonelderly, while, at the same time, elderly persons vote against increased taxes for education and services for younger persons. Bringing in industry was seen as the best solution to nonmetropolitan economic problems; still, since the early 1970s, industry has not been so willing to come to nonmetropolitan America.

The sorts of low-skill industries that might have located in nonmetropolitan communities in an earlier decade have gone overseas instead. Industries are difficult to attract to rural areas, and they are just as hard to keep there. Perhaps it is time for nonmetropolitan areas to reconsider conventional wisdom and to systematically compare the direct economic benefits that come from attracting new industry with those that come from attracting retirees.

At the same time that America has been losing its premier position in global markets, the financial status of older Americans has been improving dramatically. Today's elderly have enjoyed the benefits of the expanding economy following World War II. Social Security and Medicare have provided important foundations for the well-being of elderly Americans; and many of today's retirees have gained substantial wealth from investments in stocks, real estate, and pension funds made over the past several decades.

Taken as a whole, median household income in the United States as measured in 1987 dollars improved less than one percent between 1979 and 1987.[2] A manufacturing worker whose average gross weekly earnings were $289 in 1980 was making $396 by 1986. This 37 percent increase amounted to only 3 percent when adjusted for inflation ($377 in 1980 and $389 in 1986 with 1985 = 100).[3] Households headed by

people under age 25 had 1987 inflation-adjusted median incomes 13 percent lower than they had in 1979, while householders between the ages of 45 and 54 gained an average of 3 percent in real income.

By contrast, substantial economic gains were made by those aged 65 and over whose 1987 incomes had climbed a healthy 16 percent above 1979 averages after adjusting for inflation. Many older Americans now have the income to provide options and lifestyle choices for themselves that were unavailable to previous generations of retirees.

Retirees as an Economic Resource

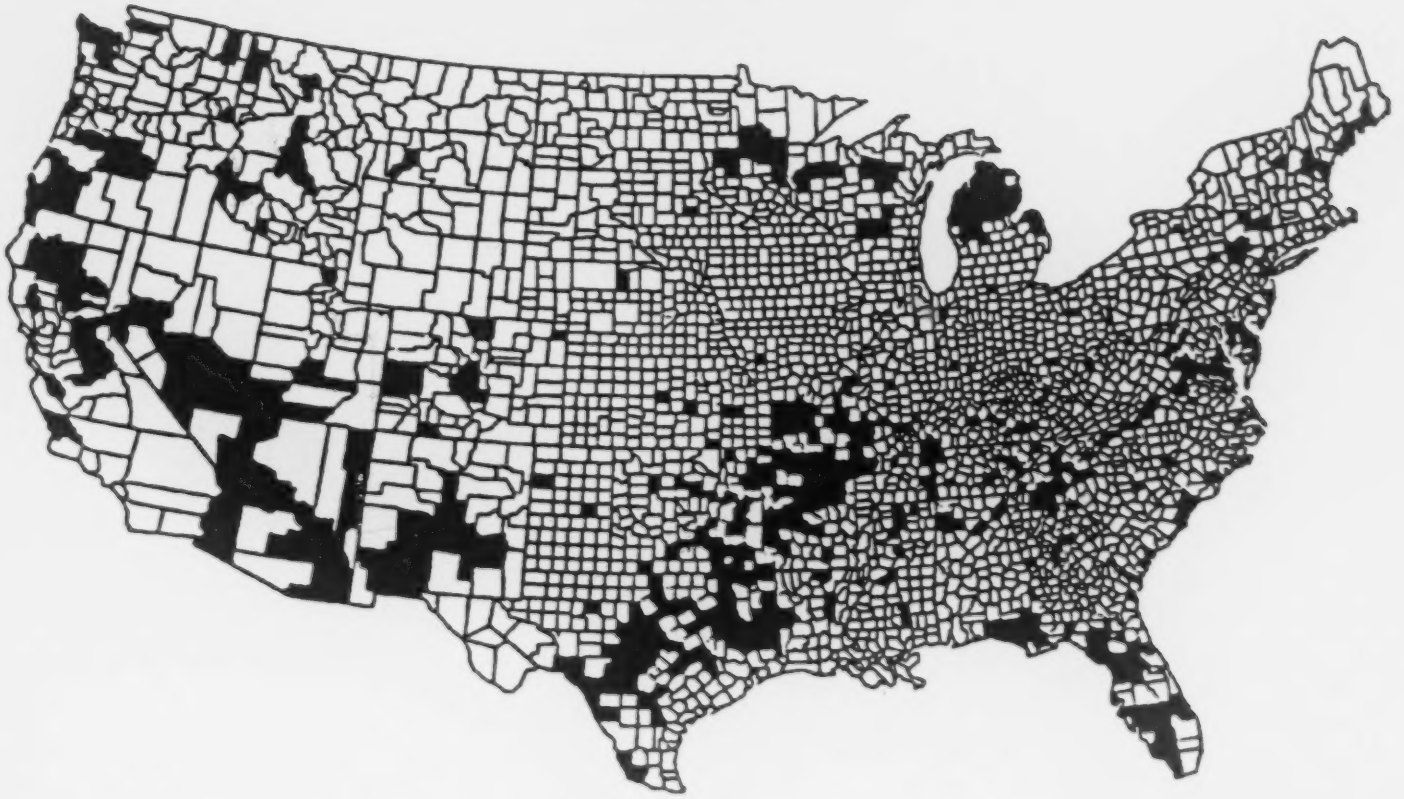
A research group in the Economic Research Service, U. S. Department of Agriculture, identified 515 out of the nearly 2,500 nonmetropolitan counties in the United States that have had high in-migration rates of elderly persons (Figure 1).[4] These counties constitute a separate economic class and have been labeled "destination-retirement" (Desret) counties. Thirty-six such counties are in Arkansas (Figure 2). Desret counties have a blend of features, including land and water forms, that attract elderly migrants and tourists. Such areas should not be confused with "aging-in-place" counties where there are high proportions of elderly people because of the selective net out-migration of younger people. Many aging-in-place counties are in farming regions that have experienced tough economic conditions in the 1980s.

Based on a variety of measures, Desret counties have more robust economies than the rest of nonmetropolitan America. These counties outperformed other nonmetropolitan counties from 1983-1986 in both service-producing and goods-producing employment.[5] And while more than half of all nonmetropolitan counties lost population between 1983-1986, Desret counties grew.[6] The top third of these counties grew by 20 percent between 1984-1986.[7] Desret counties clearly have a positive economic climate, but their potential has largely gone unrecognized. State governments and local communities compete for manufacturing firms, and they willingly spend money to entice tourists to visit. Gilmer and Pulsipher[8] point out that even if state efforts to recruit industry are successful, metropolitan areas will be the more likely beneficiaries. However, nonmetropolitan places can probably compete with metropolitan places for retirees on an equal footing. Over one-third of the fastest growing Desret counties in 1984 were totally rural, with no town population as large as 2,500.[9] Retirement, then, is an economic development strategy open to the more sparsely populated nonmetropolitan counties. But it is a strategy that, with the exceptions of Idaho and South Carolina, state governments have done little to promote.

Productivity has lagged in U.S. manufacturing compared to Northern Europe and Japan.[10] Decelerating gains in manufacturing productivity coupled with the expanded wealth, income, and numbers of elderly citizens have contributed to changes both in the economic structure of this country and in its distribution of wealth. Changed conditions should cause community leaders to reassess the relative benefits of various economic development options. Earnings from agriculture, manufacturing, and mining are now less important components of total personal income

Figure 1

Destination Retirement Counties
1970 to 1980



Source: Adapted from chart, U.S.D.A., E.R.S., *The Diverse Social and Economic Structure of Non-Metropolitan America*, Rural Development Report No. 49, p. 19.

Figure 2

Arkansas Destination-Retirement Counties
1970 to 1980

Source: Adapted from chart, U.S.D.A., E.R.S., *The Diverse Social and Economic Structure of Non-Metropolitan America*, Rural Development Report No. 49, p. 19.

than they were in 1970, but property and transfer income (dividends, interest, rent, Social Security, and Medicare) are proportionally greater. In 1986, about one-third of the $22,000 average household income of persons 65 and over came from Social Security. Moreover, measured in constant dollars, aggregate retirement transfer payments grew at an average annual rate of over seven percent between 1966 and 1984. Overall the incomes of elderly people exceeded those of other Americans in 1985, and more of their income was discretionary.[11]

States such as Florida, Arizona and California have benefited from the social and economic contributions of retired persons. Britton and Hehr[12] used banking data to analyze the financial impact of retirement in Arkansas. They divided Arkansas counties into three groups (36 nonmetropolitan Desret, 31 nonmetropolitan-nonretirement counties, and 8 metropolitan counties). In 1960, the base year, total deposits in commercial banks were smallest in the Desret counties, but by 1987 this county group had the largest deposits. More importantly, savings and specified time deposits in Desret counties rose from 23 percent of total deposits in 1960 to 81 percent in 1985. Britton and Hehr concluded that commercial banks in Arkansas Desret counties are relatively resistant to the insolvency threat so prominent in the 1980s. Moreover, their funds are available to finance further development of local areas. Harmston[13], working in a small Missouri community estimated that retirement income had a multiplier effect of 1.9. Doekson and Lenard[14] demonstrated that retired people added 10 million dollars annually to a small Oklahoma town of 8,000. It remains, however, to compare the local direct economic benefits from retiree expenditures with those of employees of a manufacturing plant.

Comparing Manufacturing and Retirement

As Wadsworth and Conrad painstakingly demonstrated in a classic study, a substantial portion of industrial wages leave the local county.[15] Non-resident commuters who come into the county to work at the new plant take their earnings to their home county. County residents who formerly worked outside the county and brought money home leave their jobs to work at the new plant. Both retirees and plant workers will pay state and federal taxes, although the tax share from retirees will be somewhat reduced by tax credits and other special provisions for those aged 65 and above. Only the plant employees will contribute to a pension fund where money may be invested elsewhere. Thus, from a small area perspective, leakages from the local economy are far greater for the plant workers than for the retirees.

If we assume a constant income multiplier for the workers earning $18,000 a year at the new plant and 100 inmigrant retiree households whose annual incomes are conservatively assumed to be equal to those of the manufacturing workers[16], we find that it takes 3.7 new manufacturing jobs to equal the economic impact of one new retiree household (Table 1). If the county were to attract inmigrant retirees with higher household incomes, the substitution rate would become even more favorable toward retirement as an economic growth strategy. Other scenarios could also be developed in which differential

Table 1

Comparison of Direct Economic Effects of Inmigrant Retirees With New Industrial Plant Employees

Item	Development option: New industrial plant with 100 employees		Development option: 100 inmigrant retiree households
Annual gross income in county economy:			
* Average weekly earnings in manufacturing is $350, or $18,200 per annum	$1,820,000		
* Average annual income per retiree household is equivalent to manufacturing worker			$1,820,000
Leakages:			
* 35 resident employees terminate their employment outside the county to work at the new plant[1]	-$637,000		--
* 15 nonresident commuters obtain employment at the new plant[1]	-$273,000		--
* Federal and state taxes sum to 20 percent for plant employees, and 15 percent for retirees	-$364,000		-$273,000
* Pension deductions at 7 percent	-$127,400		--
Remainder	$418,600		$1,547,000
Substitution rate	1,547,000/418,600	=	3.7

[1]H.A. Wadsworth and J.M. Conrad, "Leakages Reducing Employment and Income Multipliers in Labor-Surplus Rural Areas," *Journal of Farm Economies*, Vol. 47, No. 5, Dec. 1965, pp. 1187-1202. When a new plant with 100 jobs came to Linton, Indiana, 38 local commuters switched to the new plant, as well as 17 nonresident workers.

multipliers were attributed to retirement and manufacturing or different estimates of leakages were made. We feel that realistic modifications in the budget do not substantially change the end result: inmigrant retirees offer small communities more direct economic benefits than do manufacturing plants. The substitution rate may be between two and six.

Other Considerations

Our analysis gives cause to reconsider the prevalent economic development strategy of competing just for factories. Leaders who prepare development proposals should be alert to opportunities where probabilities of success are high. They should also be wary of having too specialized economic development programs. Inmigrant retirees can generate greater economic benefits than manufacturing plants. Not only is the substitution rate favorable, but there are fewer associated risks and costs. Moreover, the specialized demands of manufacturing plants may cause smaller communities to be at a disadvantage in competing for new industry, particularly when a plant requires large numbers of workers with specific skills or training. Smaller towns may be competitive with larger ones in recruiting retirees, particularly when ample health care resources are available. Communities intent on attracting manufacturing plants need a developed educational infrastructure, while those targeting retirees need quality medical facilities. Finding laborers for initial plant construction can be difficult in some nonmetropolitan areas, but even the smallest communities can generally supply the needed workers to build new homes.

Both a new manufacturing plant and incoming retirees will create construction jobs. But while the plant generates an abrupt increase in the number of jobs, the increase is only for the duration of the project; building new homes for retirees or remodeling existing ones is likely to create fewer jobs, but since inmigration is a continuous process, the jobs will last longer. Manufacturing plants may pollute the air and streams. Costs to the local community in strains placed on local services may exceed the benefits from jobs created. And the plant may close, leaving an idle building ill-suited for alternative uses. Ecological damage is hard to repair, and an injured landscape limits other economic options. Potential liabilities loom large. The retiree may be less polluting, more economically stable, and may create service jobs in recreation, retailing, health, transportation, and financial services. Retirees, especially in capital deficient areas, may apply their knowledge and assets to begin new business ventures or to provide needed investment funds for others. Retirees may work part-time or volunteer in community efforts.

Retirees are unlikely to burden local and state resources unless they have a prolonged illness requiring extended nursing home care[17]. In fact, Desret counties spend less per capita on local government services (education, highways, welfare), and for health and hospitals than other nonmetropolitan counties.[18] Lower rates of spending for health-related services may or may not be viewed as positive, but lower spending for education may jeopardize the most important and long-term rural development strategy of all: improving the employability and income levels of rural people by increasing their levels of literacy

and occupational skills. It must also be pointed out that retirees with low incomes are not the economic boon that affluent retirees are, and that not all geographic areas can expect to be successful in their bids to attract affluent retirees.

What do Retirees Want?

Attracting the affluent retiree is a complicated marketing problem. First, for most people, retirement does not mean a move to a different state; only an estimated one in 123 moves to another state in retirement.[19] Of those who do move upon retirement, many move again, either to another state or to return home. Second, retirees are not all looking for the same things in a retirement destination, although scenery, living costs, climate, personal safety, the availability of services, and leisure-time facilities are considerations for most. Charles Longino[20] divided retirees into those he called "comfortably retired" and those he considered the "pension elite." Longino found that the high population states of California, New York, Florida, and Pennsylvania had the largest numbers of the "pension elite." Some low income states have pockets with concentrations of affluent retirees.

Summary

In this paper, we have tried to answer the question, "How does attracting retirees compare with attracting manufacturing jobs as a small area economic growth option?" Based on our information, we conclude that the answer is "very favorably."

We have looked at some of the major benefits and problems for those small communities that wish to consider retirement as a new economic option. Other researchers may wish to refine our analysis by focusing on a particular geographic region or by adding other economic options. We believe that our inquiry is important for several reasons. First, the economic problems faced by farming, mining, forestry, and manufacturing are causing sustained concern in much of rural America. Effects of economic restructuring, including bank failures, are causing community leaders to ponder their economic futures. Alternatives with more promise need to be identified and nurtured. Second, in highly scenic rural areas, manufacturing has the tendency to harm the very environmental features that attract retirees and tourists. Thus, local leaders and entrepreneurs must guide their economies into more productive directions.

Some state governments, especially in the South, should develop more effective strategies to incorporate retirement into their economic planning. They should focus on ways to attract and retain the more affluent strata of older people from throughout the nation. And they should develop measures to foster the success of economic ventures that some of the in-migrant retirees will finance.

Clearly, older people considering retirement need accurate information and well planned facilities. Private developers and government leaders interested in promoting retirement as an economic option need to be especially aware of the need to (1) motivate those in farming, manufacturing, and forestry to conduct their operations so as to prevent environmental damage from soil erosion, water pollution, wildlife destruction, and scenic degradation; (2) recognize also that tourism is an expanding

source of employment for older workers in many destination-retirement counties; and (3) foster efforts to increase communication between inmigrant retirees and native people to gain the most benefit from the changing mix of ideas and other resources.

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[2]Julie Waldrop, "Inside America's Households," *American Demographics*, March 1989, pp. 20-27.

[3]Council of Economic Advisors, *Economic Indicators* (Washington, D.C.: Government Printing Office, March 1986 and April 1989); and Standard and Poor's Statistical Service, *Basic Statistics: Price Indexes, Commodities, Producers, Cost of Living*, April 1988, p. 76.

[4]Lloyd Bender, Bernal L. Green, et al., *The Diverse Social and Economic Structure of Nonmetropolitan America* (Washington, D.C.: Economic Research Service, U.S. Dept. of Agriculture, Rural Development Research Report No. 49, Sept. 1985).

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[8]Robert W. Gilmer and Allan G. Pulsipher, "The Recent Economic Performance and the Economic Future of the Rural South," *Forum for Applied Research and Public Policy*, Vol. 1, No. 1 (Summer 1986), p. 110.

[9]Mary Jo Schneider and Bernal L. Green, *Retirement Counties:*.

[10]Lester C. Thurow, "A Weakness in Process Technology," *Science*, Vol. 238, Dec., 1987, pgs. 1659-1663.

[11]Gary W. Smith, David B. Willis, and Bruce A. Weber, "The Aging Population, Retirement Income and the Local Community," *Community Economics*, July, 1987, p. 11.

[12]Charles R. Britton and John G. Hehr, "The Financial Impact of Retirees on Arid and Semi-arid Areas of Western United States," presented at the Economics and Use of Arid Land Resources session of Arid Lands Studies, Western Social Science Association, Albuquerque, New Mexico, April 27, 1989.

[13]Floyd K. Harmston, "A Study of the Economic Relationships of Retired People and a Small Community, *Regional Science Perspectives*, Vol. 11, No. 1, 1981.

[14]Gerald A. Doekson and Vanessa Lenard, "The Impact of Elderly on the Economic Base of a Community," presented at the Ozarks Regional Commission's Governor's Conference on Aging, Kansas City, Mo., October 20-21, 1980.

[15]H. A. Wadsworth and J. M. Conrad, "Leakages Reducing Employment and Income Multipliers in Labor-surplus Rural Areas," *Journal of Farm Economics*, Vol. 47, No. 5, Dec. 1965, pp. 1187-1202. Wadsworth and Conrad examined changing employment patterns when a manufacturing plant employing 100 people opened in Linton, Indiana, a community of 6,000 people. Although Wadsworth and Conrad's study was conducted in 1964, there is little reason to believe that their estimates would not be generally valid today. If anything, improved roads would be likely to increase the percentage of commuters, making earlier estimates conservative. Unfortunately, the meticulous and expensive data collection upon which Wadsworth and Conrad based their results has not been carefully replicated.

[16]Inmigrant retirees to Hot Springs, Arkansas, are estimated to have an average net worth of $215,000 and an average annual disposable income of $33,000 (Linton Weeks, "Gray is Gold," *Southern Magazine*, July/August 1989, p. 38).

[17]Nursing home care averages $30,000 a year and is currently not covered under Medicare provisions. When costs deplete individual savings, they are borne by Medicaid, a program with federal, state, and sometimes local financing. The portion of Medicaid costs paid by the federal government ranges from 50 to 83 percent. The percentage is determined by a formula which provides higher reimbursement levels in states with low per capita incomes.

[18]Richard J. Reeder and Nina L. Glasgow, "The Economic Development Consequences."

[19]Richard Boyer and David Savageau, *Retirement Places Rated: All You Need to Know to Plan Your Retirement* (Chicago: Rand McNally, 1987), p. x).

[20]Charles Longino, "The Comfortably Retired and the Pension Elite," *American Demographics*, June 1988, p. 24.

Forward Selling Soybeans With Cash Forward Contracts, Futures Contracts, and Options

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Introduction

Large fluctuations in commodity prices in recent years have spurred farmers' interest in forward selling which involves selling a farm's crops before they are actually harvested. Most farmers purchase inputs at the beginning of the production period, but they do not sell crops until they are ready to harvest. Because farm inputs are priced at one point in time and the products at a later time, the farming operation is exposed to price risk. Over a 5-7 month growing season, considerable variation can occur in crop prices. To insure the financial survival of the farm, a farming operation must be able to endure these price savings, or must find a means to reduce exposure to varying output prices.

One means to reduce price exposure is to price the crop at the beginning of the growing season. Farmers with high levels of debt can reduce risk by forward selling when inputs are purchased. Forward selling at points during the growing season can be used to average the ups and downs of prices. For a highly leveraged operation, price averaging is a superior strategy to selling at one point in time, such as at harvest. The danger in selling the entire crop at harvest is that the price may be low, and the farmer may not receive sufficient revenue to pay loans that are due.

Another use of forward selling is to "fix" a crop price when renting farmland. When a rent agreement is being considered, a farmer can estimate the return on the farm using the current price for inputs and the forward selling price for the crop. If the estimated return is sufficient to justify the use of the farmer's time and resources to farm the land, the price for the crop can be fixed at the time the rent agreement is signed by forward selling.

Forward selling can be carried out by signing a cash forward contract with a local elevator or by hedging with futures contracts. Both have been available to Arkansas soybean farmers for at least 20 years. A third means of forward selling is through options on soybean futures which were first traded at the Chicago Board of Trade (CBT) in October 1984.

Forward contracts for soybeans are offered by most elevators in Arkansas as early as January each year. A forward contract represents an agreement between a producer and an elevator whereby the

producer agrees to deliver a specified number of bushels at harvest, and the elevator agrees to pay a specified price for the soybeans upon delivery. The specified price in the contract is for a certain quality grade with premiums and discounts for other qualities.

One alternative to forward contracting is hedging with futures contracts. When hedging, a soybean producer sells soybean futures contracts as a temporary substitute for the sale of the cash soybeans that will occur at harvest (or later). When the soybeans are actually sold in the cash market, the futures position is offset.

A third means for soybean producers to forward sell their crop is with options on soybean futures. A put option gives the buyer the right, if he chooses, to sell a particular futures contract at a specified price. The advantage of buying a put option is that if prices rise during the growing season, the farmer can forego selling soybean futures, and instead sell his crop in the higher cash market. By contrast, when hedging or cash contracting, the producer is locked-in at a certain price, and is unable to sell at the higher cash market price. Options will be discussed in the fourth section.

This paper examines cash forward contracting, hedging, and buying put options as means of forward selling. The second section explains how soybeans can be hedged using soybean futures contracts. The third section compares a cash forward contract to a hedge. The fourth section shows how options can be used to forward sell a crop, and compares the use of options, cash forward contracts and futures hedges. The last section provides the conclusions.

Hedging with Futures

To hedge is to assume a futures position equal and opposite to an existing, or anticipated, cash position.[2] A soybean farmer is long in the cash market in the sense that he has a growing crop in the field (or will be planting a crop soon). The growing crop represents ownership of soybeans. To lock-in a price for his crop, the farmer hedges by selling soybean futures. The short position in futures serves as a temporary substitute for the eventual sale of the cash soybeans which will occur at harvest (or later). An example can best explain hedging.

Assume it is March and an Arkansas soybean producer is considering hedging part of the soybean crop which he is preparing to plant. The November (or harvest) soybean futures contract is trading at $8.00/bu., and the soybean producer's local harvest basis is expected to be -$0.22/bu. The basis equals the cash price at harvest at the farmer's local elevator minus the November futures price. The expected harvest price from hedging is $7.78/bu. ($8.00-$0.22). After subtracting the futures commission cost of $0.01/bu., the target price for the hedge is $7.77/bu. (Table 1).

Assume that in March the soybean producer decides to hedge 5,000 bushels of his anticipated production by selling 5,000 bushels of November soybean futures at $8.00/bu. (Table 1). Moving forward in time to harvest, the soybean producer sells his soybeans at his local elevator for $6.50/bu., and offsets his short November futures position at $6.60/bu. The net price the producer receives from hedging is $7.89/bu., which is the sum of the cash price

Table 1

Soybean Hedging Example

Date	Arkansas Cash Price		Nov. Futures Price		Harvest Basis
March	Expected Harvest Price	$7.78	Sell 5,000 bu. at	$8.00	-$0.22(Expected)
	Hedging Cost	-0.01			
	Target Price	$7.77			
Harvest	Sell 5,000 bu. at	$6.50	Buy 5,000 bu. at	$6.60	-$0.10
			Futures Profit	$1.40	

Summary:

$6.50/bu.	Price received at harvest at the producer's local elevator
1.39/bu.	Futures profit minus futures transaction cost of $0.01/bu.
$7.89/bu.	Net price received

at harvest ($6.50) and the gain on the futures position ($1.40) minus the futures commission cost ($0.01)--Table 1. If the producer had not hedged, he would have received $6.50/bu., which is $1.39/bu. less than the net price from hedging. The fact that the price without hedging is less than the net price from hedging shows that hedging is effective in protecting the producer from the decline in soybean prices that occurred between March and harvest.

Cash Forward Contracting Compared with Hedging with Futures

Farmers have used cash forward contracts more often than futures to forward sell crops. A survey of grain farmers by the Commodity Futures Trading Commission in 1977 revealed that only 7.5 percent of grain farmers had traded futures, whereas 20 percent had used cash forward contracts to sell grain.[3] A 1985 survey of a selected group of Indiana grain farmers showed that 11.5 percent of the anticipated production of these farmers was hedged, while 23 percent of anticipated production was sold on cash forward contracts.[4] The 1985 survey also pointed out that more highly leveraged operations were more likely to forward sell.

The advantages and disadvantages of forward selling with cash forward contracts and futures are discussed below.

Exact number of Bushels Can Be Contracted

A forward contract can be written for any number of bushels, compared to a futures hedge which is available only in futures contract sizes of 5,000 bushels at the CBT, or mini-contracts of 1,000 bushels at the Mid-America Commodity Exchange (MACE). The inability to match exactly the desired hedge level for a farm with a multiple of futures contracts is referred to

as the "lumpiness" issue. Lumpiness can be a problem, depending on the size of the farming operation.

For example, consider three sizes of farming operations whose desired hedge levels are 600, 7,600, and 47,600 bushels, respectively. The closest futures contract multiple to 600 bushels is 1 MACE futures contract for 1,000 bushels; and to 7,600 bushels is 1 CBT contract plus 3 MACE contracts for 8,000 bushels; and to 47,600 contracts is 9 CBT contracts plus 3 MACE contracts for 48,000 bushels. All three size farms are overhedged by 400 bushels. However, 400 bushels is 67 percent of the desired hedge level of 600 bushels compared to 5.3 and 0.8 percent, respectively, of the desired hedge levels of 7,600 and 47,600 bushels. A very significant mismatch occurs when hedging an desired level of 600 bushels with 1,000 bushels, whereas an insignificant mismatch occurs when hedging 47,600 bushels of cash grain with 48,000 bushels of futures.

Nelson examined the impact of lumpiness on three sizes of California wheat farming operations--600, 7,600 and 47,600 bushels.[5] He found that lumpiness can strongly influence the difference between the revenues generated by cash forward contracts and futures hedges for farms hedging 600 bushels. For farms hedging 7,600 bushels and 47,600 bushels, the impact of lumpiness on the differences in revenues was not great.

The conclusions from Nelson's study should be applicable to Arkansas soybean farms. A rule-of-thumb for Arkansas soybean farmers might be to ignore the mismatch between the desired hedge position and the closest futures position if the mismatch is less than 6 percent of the desired hedge position. By contrast, if the mismatch is more than 6 percent, the farmer should consider the lumpiness of futures contracts, along with other factors, in deciding whether to cash contract or hedge.

Margin Is Required When Hedging

A margin of generally $1500 to $2500 must be put up when a soybean futures contract is sold, whereas no money is put up when a forward contract is signed. Moreover, when prices rise, a hedger faces margin calls on the futures position. In the example in Table 1, if the November futures price rises to $9.50/bu., the farmer will be required to deposit additional margin money to cover the $1.50/bu. loss in the futures position ($9.50-$8.00). The margin call on a 5,000 bushel CBT futures contract is $7,500. A banker who understands hedging will loan the farmer money to cover the margin call based on the increased value of the farmer's crop. However, obtaining a loan to cover a margin call can be a problem, because many bankers do not understand hedging[6]

Exact Selling Price Is Known When Cash Forward Contracting

The exact selling price is known when a forward contract is used, whereas hedging does not guarantee an exact price because the harvest basis is not known at the time a hedge is initiated. The difference between the actual harvest basis and the harvest basis expected at the time a hedge is initiated is the same as the difference between the net and target prices for a hedge. This is illustrated in the example in Table 1 where the net price received from hedging ($7.89) is higher than the target price ($7.77) by the same amount that the actual harvest basis (-$0.10) is higher than the expected harvest basis (-$0.22).

The amount of uncertainty involved in hedging can be determined from the variability in the harvest basis. The range in the harvest basis for East Central Arkansas for 1978-87 is from -$0.49/bu. to -$0.04/bu. (column 2, Table 2). If the November futures price is say $8.00/bu. when a hedge is placed, the target price will be $7.78/bu. ($8.00-0.22). If the actual harvest basis is -$0.49/bu., the net price will be $7.51/bu.; whereas if the actual harvest basis is -$0.04/bu., the net price will be $7.96/bu. Based on the range in the East Central harvest basis, the net price can be as much as $0.27/bu. less than the target price ($7.51-7.78) to as much as $0.18/bu. above the target price ($7.96-7.78). The variability in the harvest basis is the cause

Table 2

Monthly Average Basis, Forward Contract Price, Net Price from Hedging, and Difference Between Net Price and Forward Contract Price for East Central Arkansas, 1978-87

Month Initiated	Forward Contract Basis[a]	Forward Contract Price[b]	Net Price from Hedging[c]	Net Price Minus Forward Contract Price[d]
	Dollars per Bushel			
Jan.	-0.41	6.03	6.21	0.18
Feb.	-0.38	5.95	6.11	0.16
Mar.	-0.38	6.09	6.24	0.15
April	-0.34	6.19	6.30	0.11
May	-0.33	6.18	6.28	0.10
June	-0.34	6.12	6.23	0.11
July	-0.31	6.11	6.19	0.08
Aug.	-0.28	6.12	6.16	0.04
Sept.	-0.25	6.25	6.27	0.02
Harvest	-0.22[e] (-0.49 to -0.04)[f]			

Note: Forward contract prices for East Central Arkansas (including elevators at Wynne, Hazen and Marianna) are reported weekly in the "National Grain Market Review," Cooperative Extension Service, University of Arkansas.

[a]Average forward contract price for harvest (Oct./Nov.) delivered soybeans minus average November futures price.

[b]Average forward contract basis (column 2) plus average November futures price.

[c]Average harvest cash price plus the return on the November futures position minus the futures transaction cost ($0.01/bu.).

[d]Column 4 minus column 3.

[e]Average of the October basis and the November basis.

[f]Numbers in parentheses reflect the range in the harvest basis for the 10 years 1978-87.

of the uncertainty involved in hedging, which is reflected by the net price being different from the target price.

If a farmer cannot accept the level of price uncertainty involved in hedging, then he should forward sell using a cash contract. When cash contracting, the farmer will know the price he will receive at the time he signs the contract, rather than an approximate price when he hedges.

Higher Price Is Expected from Hedging

Based on economic logic, a higher price is expected from hedging compared with cash forward contracting. To verify this empirically, cash forward contract prices were collected for East Central Arkansas elevators. The contract prices represent average prices paid by a sample of elevators in Wynne, Hazen, and Marianna, Arkansas, for harvest (October-November) delivered soybeans.[7] Contract prices are reported weekly, beginning at least by January each year. The weekly contract prices were averaged by months for the 10 years, 1978-87 (column 3, Table 2). The price of $6.09/bu. for March represents the average price received by an East Central Arkansas soybean farmer who cash contracted each March for the 10-year period. For comparison, the average net price from hedging was calculated by months for the same period (column 4, Table 2). A farmer who hedged soybeans each March during the 10-year period received an average net price of $6.24/bu.

The average difference between the net hedge and cash forward contract prices for an East Central Arkansas soybean farmer for the years 1978-87 are shown in the last column of Table 2. For all the months, the net price from hedging is higher than the forward contract price.[8] The price advantage from hedging over contracting decreases as harvest is approached. For example, the difference between the January hedge price and the January contract price is $0.18/bu; whereas the difference between the August hedge price and the August contract price is only $0.04/bu.

The fact that the cash forward contract price is less than the hedge price does not mean that the contract price paid by the elevator is unfair. After all, an elevator that contracts is assuming basis risk, and risk justifies a return. The return the elevator receives is from an increase in the harvest basis compared to the contract basis. For an individual contract, an elevator may or may not make a profit. It all depends on whether the actual harvest basis is higher, or lower, than the contracting basis. On average, an elevator has to make a profit from contracting or there would be no incentive for the elevator to offer cash forward contracts to soybean farmers.

From the perspective of the soybean farmer who contracts with an elevator, if the contract basis is less than the average harvest basis, then the contract price will be less than the net price from hedging. For example, assume that a farmer contracts with an elevator in March to deliver a specified number of bushels of soybeans to the elevator at harvest at a basis of -$0.38/bu. versus the November soybean futures. If the November futures price is $8.00/bu. when the contract is signed, the contract price to the soybean farmer will be $7.62/bu. ($8.00-$0.38).

Rather than contracting with an elevator, the soybean farmer can choose to hedge. The net price from hedging will depend on the harvest basis. Over the 10 years, 1978-87, the harvest basis has averaged

Table 3

Soybean Hedging Example with Actual Harvest Basis Equal to Expected Harvest Basis

Date	Arkansas Cash Price		Nov. Futures Price		Harvest Basis
March	Expected Harvest Price	$7.78	Sell 5,000 bu. at	$8.00	-$0.22 (Expected)
	Hedging Cost	-0.01			
	Target Price	$7.77			
Harvest	Sell 5,000 bu. at	$6.50	Buy 5,000 bu. at	$6.72	-$0.22
			Futures Profit	$1.28	

Summary:

$6.50/bu. Price received at harvest at the producer's local elevator
1.27/bu. Futures profit minus futures transaction cost of $0.01/bu.
$7.77/bu. Net price received

-$0.22/bu. in East Central Arkansas. A hedge placed when November futures is $8.00/bu. will return a net price of $7.77/bu., if the actual harvest basis when the farmer sells his soybeans to the local elevator is -$0.22/bu. (Table 3). From year to year the harvest basis will vary from -$0.22/bu. However, over a period of years the harvest basis should average approximately -$0.22/bu. This means that for hedges placed when the November futures is $8.00/bu., the net price will average approximately $7.77/bu., which is $0.15/bu. higher than the cash forward contract price of $7.62/bu.

More Flexibility When Hedging

A hedge allows more flexibility in that it can be lifted at any time, whereas a cash forward contract cannot be cancelled without approval of the contracting elevator. When the price outlook changes, a soybean farmer may want to cancel a previous commitment to sell. A hedge can be lifted easily and inexpensively ($25-30 commission) by buying futures to offset the previous hedge sale of futures. To cancel a cash forward contract, the farmer must negotiate a release from the contract with the elevator.[9] Most likely, the elevator will charge the farmer for any expenses involved in cancelling the contract, and for any losses sustained by the elevator as a result of the cancellation.

Hedging also allows the farmer the flexibility to deliver his crop at harvest to any elevator he chooses. This can be an advantage if the farmer decides to store the crop beyond harvest and one elevator is offering a lower monthly storage charge.

Futures Contract Is Guaranteed By the Exchange

If prices should fall during the time a short soybean hedge is held, the clearing corporation of the CBT guarantees that

the gain on the futures position will be paid to the hedger. Futures contracts on major U.S. commodity exchanges have never been in default. By contrast, a cash forward contract is not guaranteed by an institution such as a clearing corporation, but instead is based on the good faith of the elevator operator to honor the terms of the contract. There have been very few problems with elevators failing to honor cash forward contracts; however, elevators can go bankrupt and be unable to meet their contractual commitments.

Failure to hedge forward contracts can cause financial problems for an elevator. If prices fall from the time a contract is signed until harvest, the elevator will lose money on the contract. To guarantee the integrity of forward contracts, it is advisable for an elevator operator to hedge by selling an equivalent amount of soybean futures to the number of bushels contracted. When an elevator operator has hedged, falling prices will not jeopardize the elevator's forward contracts because the profit from the short futures position will offset the loss from selling the contracted soybeans at a lower harvest price.

Forward Selling With Options

The simplest option strategy for forward selling a crop is to purchase a put option.[10] A put option on November soybean futures gives the buyer the right to assume a sell position in November futures at a specified price, which is called the strike price. To obtain the right to assume a short position in futures, the option buyer pays a premium to the option seller. The premium is paid at the time the put option is purchased.

An example can explain how to forward sell with a put option. Assume it is March and a soybean farmer would like to price his soybean crop. The farmer believes that soybean prices will be higher by harvest. Nevertheless, he is unwilling to wait until harvest to sell his crop because he has a large amount of debt outstanding and fears that prices might fall by harvest and he would not be able to make payments on his outstanding loans. The farmer decides that the best strategy is to buy a put option on November soybean futures. The put option will give the farmer the right to sell November soybean futures anytime between March and mid-October, but it will not obligate him to sell futures. If prices should rise by harvest as he expects, the farmer will forego the right to sell November soybean futures, and sell his crop in the cash market.

Assume the soybean farmer buys a November put option for $0.30/bu., and the harvest basis at his local elevator is -$0.22/bu. versus the November futures. The prices the farmer will receive under three different assumptions about the harvest price for soybeans are shown in Table 4. (1) If the price of the November futures rises to $9.50/bu. by harvest, the farmer will let the put option expire, and sell his crop in the cash market at $9.28/bu. ($9.50-$0.22). After subtracting the $0.30/bu. option premium and the $0.01/bu. option commission cost, the farmer will net $8.97/bu. (2) If the November futures price is $8.00/bu. at harvest, the farmer will let the put option expire and sell his crop in the cash market at $7.78/bu. ($7.78-$0.22). After subtracting the option premium and options commission cost, the farmer will net $7.47/bu.

Table 4

Comparison of Prices Received from Buying a Put Option, Selling Futures, and Selling in the Cash Market.

Nov Futures Price	Harvest Cash Price[a]	Harvest Value of $8.00 Put	Net Price from Buying $8 Put	Net Price from Hedging
	Dollars per Bushel			
9.50	9.28	0.00	8.97[b]	7.77[c]
8.00	7.78	0.00	7.47	7.77
7.00	6.78	1.00	7.47	7.77

[a]Assumes the harvest basis is -$0.22/bu.

[b]Derived as follows:

$9.28/bu. Harvest cash price
+ 0.00/bu. Harvest value of $8.00 November put option
- 0.30/bu. Option premium for $8.00 put option
- 0.01/bu. Option commission cost
$8.97/bu. Net price from put option strategy

[c]Derived by subtracting the loss on the November futures position ($1.50/bu.) plus the futures commission cost ($0.01/bu.) from the harvest cash price ($9.28/bu.)

(3) If the November futures price falls to $7.00/bu. by harvest, the soybean farmer will assume his right to sell November futures at $8.00/bu. The $8.00 put option which he purchased for $0.30/bu. in March will be worth $1.00/bu. at harvest. The profit on the put option position is $0.69/bu., which is calculated by subtracting the option premium ($0.30/bu.) plus the options commission cost ($0.01/bu.) from the harvest value for the put option ($1.00/bu.). When the farmer sells his crop in the cash market at $6.78/bu., he will offset (or sell) his put option position. The farmer's net price for soybeans is $7.47/bu., which is the sum of the harvest cash price plus the put option profit.

The major advantage of forward selling with a put option, rather than with futures or a cash forward contract, is that the farmer retains the opportunity to receive a higher price while being protected from a decline in prices. If the November soybean futures contract goes to $9.50/bu., the put option strategy nets the farmer an extra $1.20/bu. compared to a futures strategy (Table 4). If prices rise, the highest price ($9.28/bu.) is achieved by waiting until harvest to sell. However, selling at harvest provides the lowest price ($6.78/bu.), if prices should fall by harvest. With a falling price, the put option strategy achieves a net price of $7.47/bu., which is $0.69/bu. higher than the harvest price, but $0.30/bu. less than the hedge price (where the $0.30/bu. represents the cost of the option premium).

Another advantage of a put option strategy compared to a hedge is that the farmer's total expected production can be protected by buying put options. For example, a farmer who expects to produce 10,000 bushels of soybeans can buy put options on 10,000 bushels of November

soybean futures. If a severe drought were to occur and cut the farmer's crop in half and cause prices to rise, the farmer would forego the right to sell November soybean futures. By comparison, a farmer who has hedged his entire crop in a drought situation would have a sell position in the futures market (10,000 bushels) which is larger than the size of his drought damaged crop (5,000 bushels). In this situation, the farmer is overhedged. When prices rise, the loss on the 10,000 bushel futures position will be greater than the increase in the value of the 5,000 bushel crop. As a result, the net price from hedging will be reduced below the target price derived when the hedge was initiated.

To prevent overhedging, the farmer could sell only a portion of his expected production. However, the danger is that prices will decline and leave the farmer unprotected on the unhedged portion of his crop. By comparison, when buying put options, the farmer can protect his entire expected production of 10,000 bushels from a price decline without being concerned about a drought reducing his crop to 5,000 bushels. In a drought, prices generally rise and the farmer who buys put options will not take advantage of his right to sell 10,000 bushels of futures. So unlike a futures hedge, the farmer would not have a 10,000 bushel futures position against a 5,000 bushel crop.

Other advantages of forward selling using put options are the following. (1) Options provide flexibility similar to a futures hedge in that a put option can be offset (or sold) at any time for minimal cost. If the price outlook should change, a farmer may want to alter his option position. (2) Like futures, put options are guaranteed by the clearing corporation of the CBT. (3) Unlike futures, there are no margin calls on options. The only money deposited when buying an option is the initial premium. Regardless of the amount prices change during the time an option is held, no additional money is required. In this sense, an option is more like a cash forward contract which is not subject to margin calls.

A major disadvantage of forward selling with put options is the cost of the premium, which can be large especially at times when prices are highly variable. Another disadvantage is that a put option is on a futures contract which calls for delivery of a specified number of bushels of soybeans. The futures contract size may not match the cash position the farmer wishes to forward sell, which is the lumpiness issue discussed previously.

Conclusions

A farmer who decides to forward sell his crop before harvest can use either a cash forward contract, a futures hedge, or an option. The choice he makes will depend on his outlook for prices and the financial condition of his farming operation. A farmer who has a large amount of debt may consider it essential to lock-in an exact price before he plants the crop or rents land. In this situation, the farmer should cash contract with an elevator. With a cash forward contract, a farmer will not be required to deposit margin money as with futures, or meet margin calls if the price should rise. Also, a forward contract can be used to price any number of bushels, rather than multiples of the futures contract size.

A different situation is where a farmer desires to forward sell his crop because he

believes the price will be substantially lower by harvest. A futures hedge can be used to lock-in an approximate price for his crop. The fact that the farmer may receive a price ranging from say $8.00 to $8.15 per bushel should not be a concern when he believes the price will be $7.00/bu. by harvest. In this situation, the farmer may choose to hedge rather than forward contract with an elevator because the hedge price will be slightly higher than the forward contract price. Hedging will allow the farmer added flexibility in that he can quickly and inexpensively offset his hedge. Also, a soybean hedge is guaranteed by the clearing corporation of the CBT.

A third situation is when a farmer expects prices to be higher by harvest. The farmer can wait until harvest to sell. If prices are higher at harvest, this would be the best choice. However, there is always a chance that prices may be lower at harvest. A put option can be used in this situation to protect the farmer from falling prices while allowing him the opportunity to receive a higher price. The cost of the protection afforded with a put option is the premium. When deciding whether to use a put option, the farmer will need to consider the financial condition of his farming operation and the strength of his feelings that prices will rise. If his operation has little debt and he strongly feels that prices will be higher by harvest, he may choose to forego the protection afforded by a put option and wait until harvest to sell. By contrast, if his farming operation has a large amount of debt and his feelings about rising prices are uncertain, the option strategy is the best choice. By buying put options the farmer knows an approximate amount he will receive even if prices fall.

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[1]Mr. Woodworth is currently a grain merchandiser with Elders Grain, Atchison, Kansas. The authors thank an anonymous reviewer for his/her comments. This study is a contribution of the College of Agricultural Sciences, Texas Tech University, No. T-1-295.

[2]Thomas A. Hieronymus, *Economics of Futures of Futures Trading*, Commodity Research Bureau, Inc., New York, 1977, p. 175.

[3]Commodity Futures Trading Commission, "1977 Report on Farmer's Use of Futures Markets and Forward Contracts," February 1978, mimeo.

[4]B.I. Shapiro, and B. Wade Brorsen, "Factors Affecting Farmer's Hedging Decisions," *North Central Journal of Agricultural Economics*, 10, July 1988, pp. 145-53.

[5]Ray D. Nelson, "Forward and Futures Contracts," *American Journal of Agricultural Economics*, 67, February 1985, pp. 15-23.

[6]Chicago Mercantile Exchange, "The Banker and Hedging," 1975; and "Risk Management Guide for Ag Lenders: Forward Pricing Through Futures," 1982.

[7]Federal-State Market News Service, Little Rock, Arkansas, "National Grain Market Review," weekly issues for 1978-87.

[8]A South Carolina study found that the hedge price was higher than the contract price for both corn and soybeans. See H.M. Harris and S.E. Miller, "An Analysis of Cash Contracting Corn and Soybeans in South Carolina," in *National Conference on Grain Marketing Patterns*, Southern Cooperative Series Bulletin No. 307, March 1981, pp. 290-300.

[9]A forward contract can be effectively cancelled without actually negotiating with the contracting elevator by buying soybean futures contracts approximately equal to the number of bushels contracted. This neutralizes the contract because the buy position in futures essentially offsets the sell position on the cash forward contract.

[10]Other options strategies are described in *Options on Agricultural Futures: A Home Study Course* (2nd ed.), Chicago Board of Trade, Jan. 1985.

Editor's Note

With this issue, a new format and policy is being introduced to the section of the *Review* that presents data on the economy of the state of Arkansas. The traditional *Selected Arkansas and U.S. Economic Indicators* will continue to be published, though in a new format.

Under the new format, this section of the *Review* will be entitled *The Arkansas Economy* and will contain two subparts:

1) *Selected Arkansas and U.S. Economic Indicators* will contain a new layout for the tables. Moreover graphs have been added that illustrate changes in the data. Where appropriate, the data will continue to be presented in the traditional, current dollar form as well as in a real or constant dollar form. The latter is offered to more clearly present movements in series such as personal income by wringing out the effects of inflation, and

2) *Arkansas Economic Perspectives* will offer papers that examine various aspects of the Arkansas economy and provide a more in-depth treatment of specific Arkansas economic issues. For example, in this issue an article entitled "Arkansas Per Capita Income and Population in the 1980's," is presented which examines the relationship of Arkansas to the United States, and the relative economic performance of Arkansas' 75 counties.

We welcome your comments on this new format, or any other aspect of the *Review*.

DRM, Editor

The Arkansas Economy

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1989 Data Show Improvements in the Arkansas Economy

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During the first quarter of 1989, real Personal Income grew at an annual rate of almost 7% compared to 2.3% for the U.S. This follows a relatively good 1988 when real Personal Income in Arkansas grew at a 3.4% rate while the U.S. grew at a 3.9% annual rate; and Disposable Personal Income grew at a 2.8% rate compared with 3.0% for the U.S.

When compared to data from the other states in the Eighth Federal Reserve District (Missouri, Kentucky, and Tennessee), Arkansas's growth rate in Disposable Personal Income in 1988 was exceeded only by Tennessee. Also, the state's growth in payroll employment was exceeded only by Kentucky. Moreover, manufacturing employment grew by 3.7% while the average was 1.8% for the Eighth District and 2.5% for the U.S.

The persistently weak areas in the Arkansas economy continue to be high unemployment rates and low (or negative) growth rates in the construction industry. Even after strong gains in the third and fourth quarters, the dollar volume of construction contracts in 1988 was down 12.2% from the 1987 level. During the first quarter of 1989 total contracts declined 1.4% from the fourth quarter of 1988: Residential Construction was -5.0% although Nonresidential was +9.0%. However, the performance of the industry in the second quarter of 1989 was encouraging. Total contracts increased by 7.7%: Residential +10.8% and Nonresidential +4.7%. Compared to the second quarter the dollar volume of Total Construction Contracts was up by 25.4%: Residential at +19.0% and Nonresidential at +38.8%.

Between 1983 and 1988, the national average annual unemployment rate declined by 4.1 percentage points while the Arkansas rate declined by only 2.5 points. To put the current relationship into perspective it should be compared to that of 1979, just before the last recession began, when the unemployment rates of the U.S. (5.8%) and Arkansas (6.2%) were about the same. They were comparable in 1983 when the rates reached their recession high points – 9.6% and 10.1%, respectively. By 1988 the U.S. unemployment rate had declined to 5.5%, 0.3 of a percentage point below the 1979 rate, while the Arkansas rate declined to 7.6% which is 1.4 percentage points above its 1979 level.

In the previous issue of this Review it was noted that the economic indicators revealed some good things and some bad things about the Arkansas economy. Overall, the good things are associated with the healthy increase in real Personal Income during the first quarter of 1989. The bad things are associated with persistently high

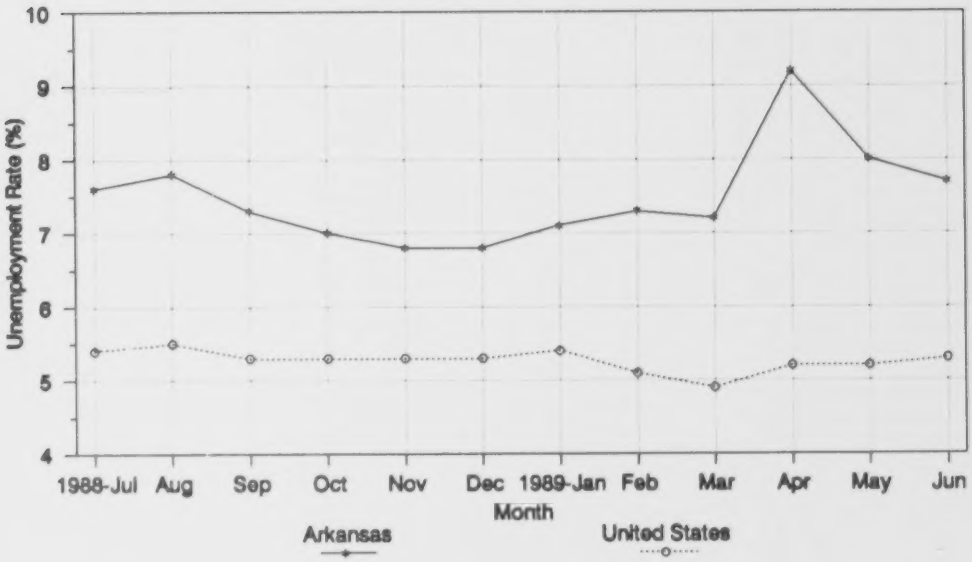
unemployment rates. However, the good and bad things are not evenly distributed across the state. The June unemployment rates (not seasonally adjusted) ranged from a low of 4.3% in Benton County to 18.1% in St. Francis County. Twenty-five counties had unemployment rates ranging form 4.3% to 7.6%, of which 6 (Arkansas Benton, Calhoun, Carroll, Washington, and Scott) had unemployment rates that were below the U.S. rate of 5.5%. Sixteen counties had unemployment rates that ranged from 11.4 to 18.1%; and 34 counties had unemployment rates that ranged from 7.7% to 11.3%.

While current county income data are not available, the most recent data suggest that, over time, the relationship between unemployment rates and the levels (and rates of change) of real income are not coincidental.

The bad news seems to be that the good news does not apply to all parts of Arkansas.

Unemployment Rates

Arkansas and U.S., seasonally adjusted



Arkansas Labor Force and Employment

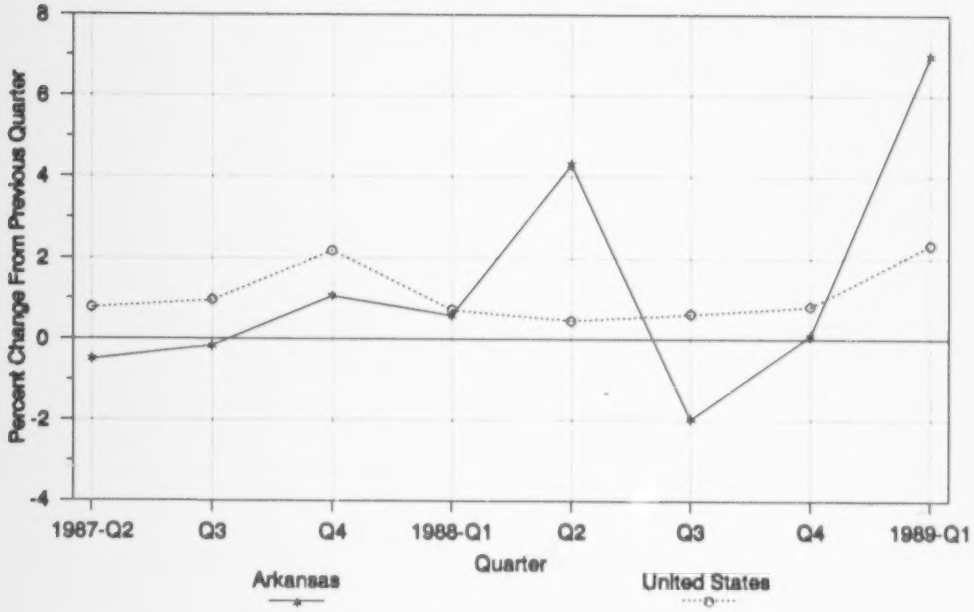
Seasonally adjusted in thousands

Year		Civilian Labor Force	Total Employment	Agricultural Employment	Manufacturing Wage and Salary Employment	Unemployment Rate Arkansas	Unemployment Rate U.S.
1980		999.8	923.4	66.3	209.2	7.7	7.1
1981		1,032.8	938.6	64.5	209.7	9.1	7.6
1982		1,024.9	924.1	63.7	195.2	9.8	9.7
1983		1,028.4	924.3	62.6	199.6	10.1	9.6
1984		1,041.0	948.1	61.6	210.2	8.9	7.5
1985		1,051.7	960.7	46.2	210.3	8.7	7.2
1986		1,072.4	978.3	45.5	213.9	8.8	7.0
1987		1,091.5	1,002.4	44.8	219.6	8.1	6.2
1988		1,123.2	1,037.1	44.1	228.5	7.6	5.5
1988	Jul	1,114.9	1,031.2	43.9	229.0	7.6	5.4
	Aug	1,105.8	1,019.4	43.9	229.3	7.8	5.5
	Sep	1,108.7	1,026.8	43.8	229.2	7.3	5.3
	Oct	1,129.3	1,048.2	43.8	230.4	7.0	5.3
	Nov	1,135.1	1,056.3	43.7	231.5	6.8	5.3
	Dec	1,143.8	1,063.9	43.8	232.6	6.8	5.3
1989	Jan	1,169.4[R]	1,088.7[R]	43.7[R]	234.3[R]	7.1[R]	5.4
	Feb	1,163.5[R]	1,080.8[R]	43.9[R]	234.1[R]	7.3[R]	5.1
	Mar	1,162.8	1,080.4	43.9	235.5	7.2	4.9
	Apr	1,169.9	1,063.8	43.7	235.2	9.2	5.2
	May	1,164.5	1,071.1	43.5	233.8	8.0	5.2
	Jun	1,154.3	1,065.7	43.4	235.1	7.7	5.3

Source: "Current Employment Developments Arkansas," Employment Security Division.
[R]Revised.

Changes in Real Personal Income

Arkansas and U.S., quarterly, seasonally adjusted annual rates



Arkansas Personal Income

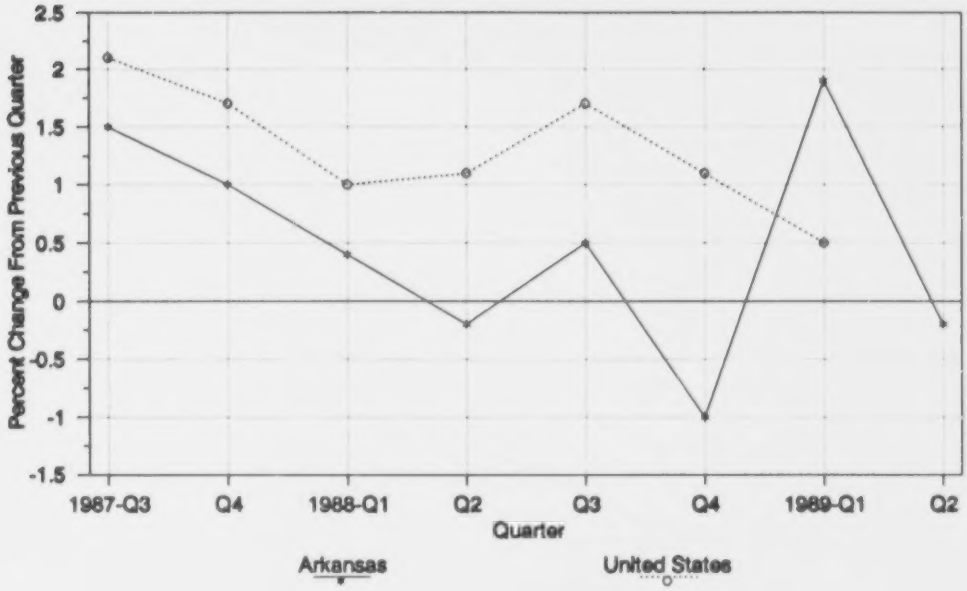
Seasonally adjusted annual rates in millions of dollars

Year		In Current $'s			In Constant 1982 $'s		
		Arkansas		U.S.	Arkansas		U.S.
		Amount	% Change	% Change	Amount	% Change	% Change
1980		17,097	8.5	11.0	19,950	-0.5	1.8
1981		19,140	12.0	11.6	20,362	2.1	1.8
1982		19,855	3.7	6.0	19,855	-2.5	-0.4
1983		21,158	6.6	6.3	20,364	2.6	2.3
1984		23,309	10.2	9.5	21,643	6.3	5.7
1985		24,838	6.6	7.0	22,397	3.5	3.9
1986		26,194	5.5	6.2	22,997	2.7	3.4
1987		27,555	5.2	7.1	23,411	1.8	3.6
1988		29,463	6.9	7.5	24,210	3.4	3.9
1987	Q2	27,384	0.4	1.6	23,345	-0.5	0.8
	Q3	27,545	0.6	1.7	23,304	-0.2	1.0
	Q4	28,002	1.7	2.8	23,551	1.1	2.2
1988	Q1	28,280	1.0	1.1	23,685	0.6	0.7
	Q2	29,890	5.7	1.8	24,702	4.3	0.5
	Q3	29,636	-0.9	1.8	24,212	-2.0	0.6
	Q4	30,047	1.4	2.1	24,231	0.1	0.8
1989	Q1	32,428	7.9	3.2	25,922	7.0	2.3

Source: U.S. Department of Commerce, Bureau of Economic Analysis (Regional Economic Information System).

Changes in U.S.Industrial Production and Arkansas Value Added

Quarterly, seasonally adjusted annual rates



Arkansas Value Added by Manufacture

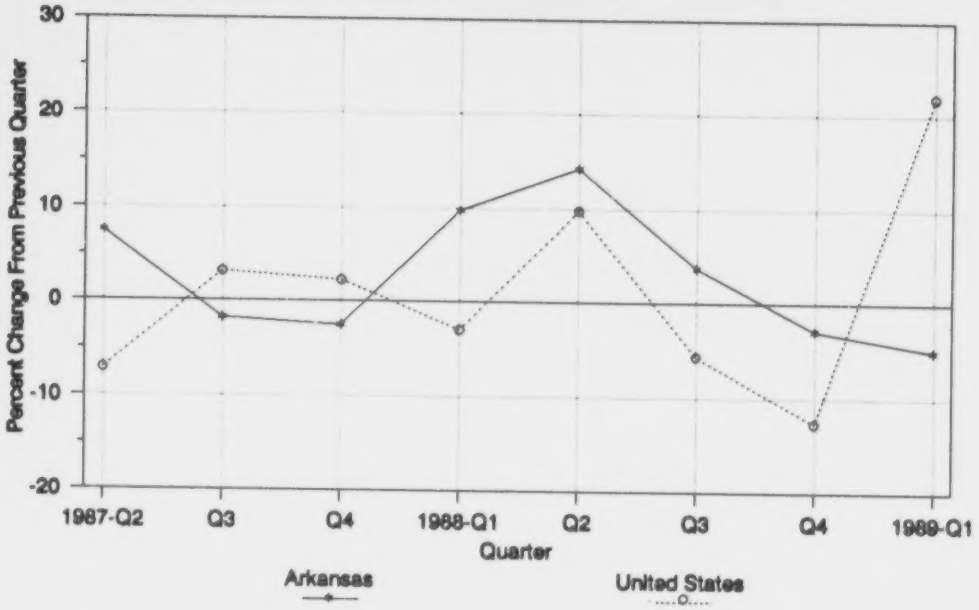
Seasonally adjusted annual rates in millions of dollars

Year		In Current $'s		In Constant 1982 $'s		
		Arkansas		Arkansas		U.S.
		Amount	% Change	Amount	% Change	% Change
1980		6,650.0	-5.4	7,759.6	-13.2	-1.9
1981		7,436.6	11.8	7,911.3	2.0	2.2
1982		7,594.5	2.1	7,594.5	-4.0	-7.1
1983		8,238.3	8.5	7,929.0	4.4	5.9
1984		9,006.2	9.3	8,362.3	5.5	11.2
1985		9,331.1	3.6	8,414.0	0.6	1.9
1986		9,725.9	4.2	8,539.0	1.5	1.1
1987		10,397.6	6.9	8,834.0	3.5	3.8
1988		10,964.2	5.4	9,009.2	2.0	5.7
1987	Q3	10,526.9	2.3	8,906.0	1.5	2.1
	Q4	10,692.9	1.6	8,993.2	1.0	1.7
1988	Q1	10,779.3	0.8	9,027.9	0.4	1.0
	Q2	10,896.9	1.1	9,005.7	-0.2	1.1
	Q3	11,076.6	1.6	9,049.5	0.5	1.7
	Q4	11,104.0	0.2	8,954.9	-1.0	1.1
1989	Q1	11,410.5	2.8	9,121.1	1.9	0.5
	Q2	11,388.2	-0.2	9,103.3	-0.2	NA

Sources: Arkansas Value Added by Manufacture: BBER Computation. U.S. Industrial Production: "Production and Business Activity," *Economic Indicators*.

Changes in Real Cash Receipts from Farm Marketings

Arkansas and U.S., quarterly, seasonally adjusted annual rates



Cash Receipts from Farm Marketings

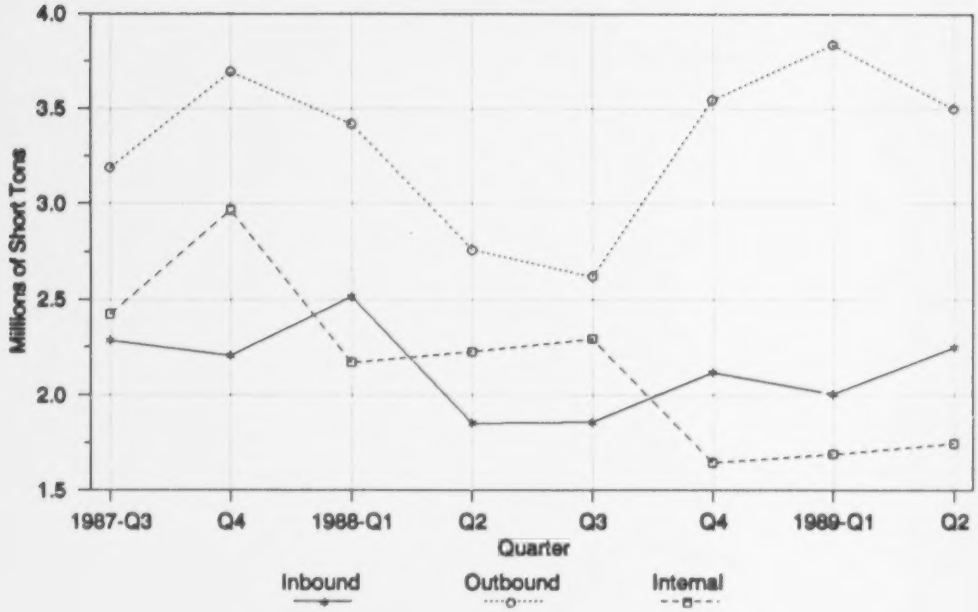
Seasonally adjusted annual rates in millions of dollars

Year		In Current $'s			In Constant 1982 $'s		
		Arkansas		U.S.	Arkansas		U.S.
		Amount	% Change	% Change	Amount	% Change	% Change
1980		3,105.9	1.4	-0.9	3,624.2	-7.0	-9.1
1981		3,391.5	9.2	11.5	3,608.0	-0.5	1.6
1982		3,254.2	-4.1	-1.7	3,254.2	-9.8	-7.6
1983		2,835.9	-12.9	-6.4	2,729.4	-16.1	-9.9
1984		3,475.8	22.6	14.3	3,227.3	18.2	10.3
1985		3,291.4	-5.3	-5.0	2,967.9	-8.0	-7.7
1986		3,027.8	-8.0	-3.9	2,658.3	-10.4	-6.4
1987		3,145.4	3.9	6.2	2,672.4	0.5	2.8
1988		3,954.5	25.7	2.5	3,249.4	21.6	-0.8
1987	Q2	3,241.4	8.4	-6.4	2,763.3	7.5	-7.2
	Q3	3,206.0	-1.1	3.9	2,712.3	-1.9	3.2
	Q4	3,143.2	-2.0	2.8	2,643.6	-2.5	2.2
1988	Q1	3,463.8	10.2	-2.6	2,901.0	9.7	-3.0
	Q2	4,009.1	15.7	11.2	3,313.3	14.2	9.8
	Q3	4,206.6	4.9	-4.6	3,436.8	3.7	-5.7
	Q4	4,138.4	-1.6	-11.5	3,337.4	-2.9	-12.7
1989	Q1	3,964.4	-4.2	23.0	3,169.0	-5.1	21.9

Sources: U.S. data: "Farm Income," *Economic Indicators*. Arkansas data: "Monthly Cash Receipts," USDA/ERS/NED.

Changes in Waterborne Freight Traffic

Seasonally adjusted



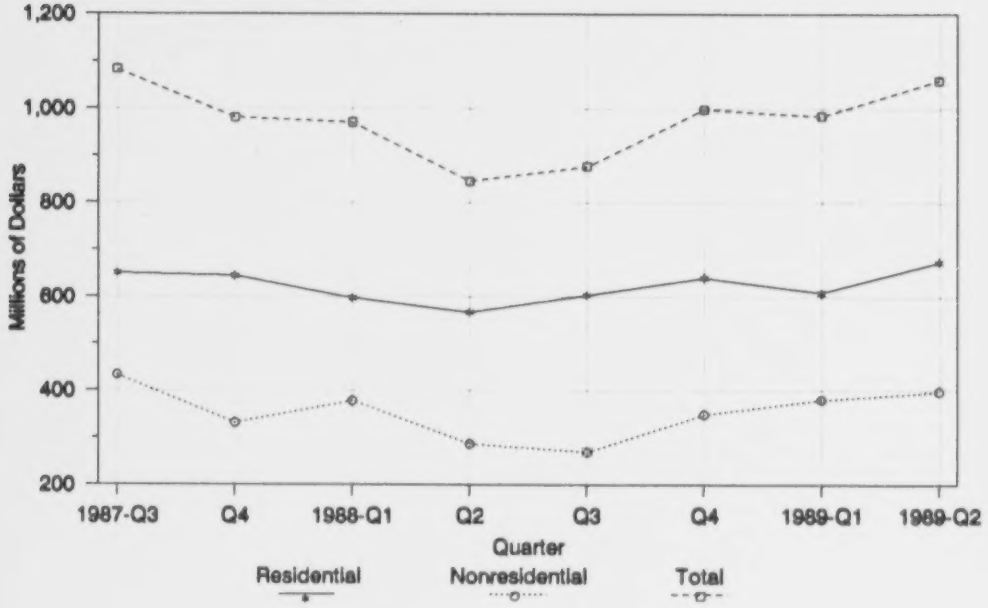
Waterborne Commerce: McClellan-Kerr Arkansas River Navigation System

Seasonally adjusted annual rates in thousands of short tons

Year		Inbound		Outbound		Internal		Total	
		Total	% Change	Total	% Change	Total	% Change	Total	% Change
1980		1,615	-20.5	4,648	34.0	2,448	-10.0	9,151	2.5
1981		1,563	-3.2	5,710	22.9	1,774	-27.5	9,449	3.3
1982		1,525	-2.4	4,596	-19.5	1,517	-14.5	8,279	-12.4
1983		1,914	25.5	3,892	-15.3	1,910	26.0	8,005	-3.3
1984		2,126	11.1	4,288	10.2	2,453	28.4	9,486	18.5
1985		2,090	-1.7	3,152	-26.5	2,437	-0.6	8,290	-12.6
1986		2,618	25.3	3,416	8.4	3,101	27.2	9,733	17.4
1987		2,129	-18.7	3,385	-0.9	2,791	-10.0	8,884	-8.7
1988		2,086	-2.1	3,084	-8.9	2,084	-25.3	7,802	-12.2
1987	Q3	2,284	3.0	3,187	-26.2	2,421	-16.3	8,476	-17.2
	Q4	2,205	-3.5	3,695	15.9	2,965	22.4	8,977	5.9
1988	Q1	2,512	13.9	3,416	-7.6	2,170	-26.8	8,873	-1.2
	Q2	1,854	-26.2	2,757	-19.3	2,225	2.5	7,566	-14.7
	Q3	1,858	0.2	2,619	-5.0	2,293	3.1	7,302	-3.5
	Q4	2,117	13.9	3,545	35.4	1,646	-28.2	7,463	2.2
1989	Q1	2,005	-5.3	3,838	8.3	1,691	2.7	8,390	12.4
	Q2	2,248	12.2	3,498	-8.9	1,748	3.4	8,027	-4.3

Source: Corps of Engineers Monthly Report – Waterborne Commerce: McClellan-Kerr Arkansas River Navigation System, New Orleans District.

Arkansas Construction Contracts
Quarterly, seasonally adjusted annual rates



Arkansas Construction Contracts
Seasonally adjusted annual rates in millions of dollars

Year		Residential		Nonresidential		Total	
		Contracts	% Change	Contracts	% Change	Contracts	% Change
1980		641.1	-8.8	355.6	-7.1	993.8	-8.7
1981		632.8	-1.3	300.5	-15.5	935.9	-5.8
1982		648.0	2.4	280.4	-6.7	927.7	-0.9
1983		904.8	39.6	366.7	30.8	1,273.8	37.3
1984		917.5	1.4	466.6	27.2	1,387.8	9.0
1985		764.2	-16.7	455.2	-2.4	1,224.6	-11.8
1986		740.8	-3.1	415.4	-8.7	1,155.2	-5.7
1987		647.2	-12.6	406.3	-2.2	1,051.1	-9.0
1988		601.3	-7.1	320.2	-21.2	922.6	-12.2
1987	Q3	649.7	0.2	432.4	-8.9	1,083.0	-2.2
	Q4	643.1	-1.0	330.3	-23.6	980.4	-9.5
1988	Q1	596.3	-7.3	377.2	14.2	970.4	-1.0
	Q2	566.1	-5.1	286.3	-24.1	845.2	-12.9
	Q3	602.9	6.5	268.9	-6.1	877.3	3.8
	Q4	640.0	6.2	348.3	29.5	997.7	13.7
1989	Q1	608.0	-5.0	379.5	9.0	983.9	-1.4
	Q2	673.9	10.8	397.4	4.7	1,059.9	7.7

Source: *F. W. DODGE Construction Potentials*, McGraw-Hill.

ARKANSAS LABOR FORCE ESTIMATES
June 1989, Not Seasonally Adjusted

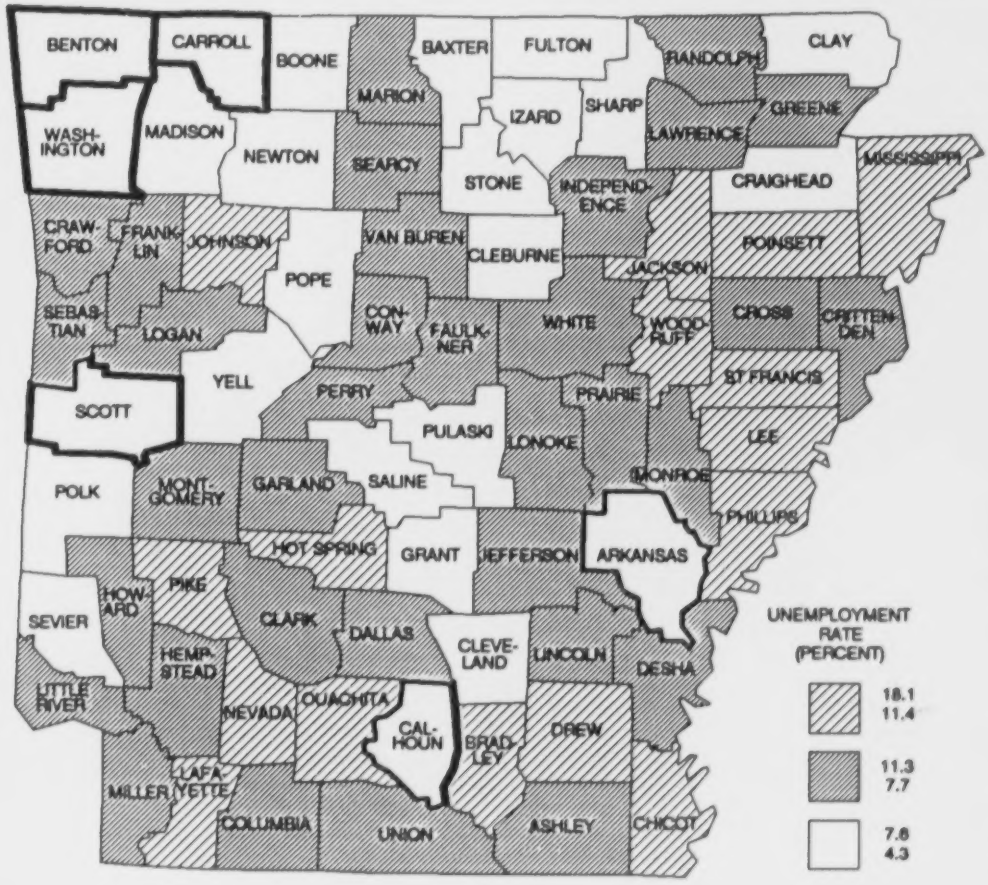
Area	Civilian Labor Force	Total Employment	Unemployment Rate
UNITED STATES	125,569,000	118,719,000	5.5
STATE OF ARKANSAS	1,195,700	1,095,500	8.4
Fayetteville-Springdale MSA	64,050	61,150	4.5
Fort Smith MSA	95,975	88,375	7.9
Little Rock-North Little Rock MSA	282,725	261,000	7.7
Pine Bluff MSA	40,175	36,350	9.5

County	Civilian Labor Force	Total Employ-ment	Unemploy-ment Rate	County	Civilian Labor Force	Total Employ-ment	Unemploy-ment Rate
Arkansas	11,300	10,750	4.9	Lee	4,700	4,000	14.9
Ashley	11,850	10,825	8.6	Lincoln	4,925	4,475	9.1
Baxter	12,300	11,450	6.9	Little River	5,850	5,200	11.1
Benton	56,400	54,000	4.3	Logan	10,150	9,275	8.6
Boone	16,050	15,000	6.5	Lonoke	19,000	17,325	8.8
Bradley	5,150	4,500	12.6	Madison	5,325	5,025	5.6
Calhoun	5,525	5,250	5.0	Marion	6,700	6,150	8.2
Carroll	11,900	11,350	4.6	Miller	18,950	17,275	8.8
Chicot	6,250	5,450	12.8	Mississippi	23,150	19,600	15.3
Clark	9,500	8,625	9.2	Monroe	5,400	4,975	7.9
Clay	9,450	8,875	6.1	Montgomery	3,150	2,900	7.9
Cleburne	9,200	8,600	6.5	Nevada	4,525	3,975	12.2
Cleveland	4,375	4,075	6.9	Newton	4,300	4,000	7.0
Columbia	13,500	12,275	9.1	Ouachita	14,775	12,950	12.4
Conway	8,675	7,875	9.2	Perry	5,075	4,650	8.4
Craighead	39,450	37,000	6.2	Phillips	10,475	8,775	16.2
Crawford	22,300	20,275	9.1	Pike	5,050	4,350	13.9
Crittenden	24,525	22,125	9.8	Poinsett	11,825	10,350	12.5
Cross	8,900	8,050	9.6	Polk	7,250	6,775	6.6
Dallas	4,625	4,200	9.2	Pope	25,850	24,225	6.3
Desha	7,775	6,900	11.3	Prairie	5,375	4,800	10.7
Drew	8,450	7,325	13.3	Pulaski	202,750	187,775	7.4
Faulkner	29,200	26,300	9.9	Randolph	7,600	6,800	10.5
Franklin	6,650	5,975	10.2	St. Francis	10,775	8,825	18.1
Fulton	4,275	3,950	7.6	Saline	31,775	29,600	6.8
Garland	32,575	29,900	8.2	Scott	6,025	5,700	5.4
Grant	7,225	6,775	6.2	Searcy	3,525	3,225	8.5
Greene	15,450	14,150	8.4	Sebastian	56,500	51,925	8.1
Hempstead	10,975	9,850	10.3	Sevier	6,950	6,425	7.6
Hot Spring	11,050	9,750	11.8	Sharp	6,925	6,450	6.9
Howard	6,475	5,850	9.7	Stone	4,475	4,175	6.7
Independence	16,975	15,425	9.1	Union	22,700	20,450	9.9
Izard	5,725	5,350	6.6	Van Buren	6,750	6,200	8.1
Jackson	9,350	8,050	13.9	Washington	64,050	61,250	4.5
Jefferson	40,175	36,350	9.5	White	25,925	23,075	11.0
Johnson	7,550	6,650	11.9	Woodruff	4,425	3,825	13.6
Lafayette	3,475	3,025	12.9	Yell	9,300	8,700	6.5
Lawrence	8,875	8,025	9.6				

Source: Labor Market Information for Arkansas Counties, Arkansas Employment Security Division, July 1989.

Labor Force Estimates
June 1989

In June, Arkansas' Civilian Labor Force increased by 19,900 to total 1,195,700. Total Employment gained by 14,000 to total 1,095,500. Also, Unemployment rose 5,900 to total 100,200. Of the 75 counties, Benton had the lowest unemployment rate, 4.3 percent, and St. Francis, the highest, 18.1 percent. Thirty-three counties had unemployment rates equal to or below the state rate, 8.4 percent; but 23 counties had rates above 10 percent. Of the MSAs, Fayetteville-Springdale had the lowest unemployment rate, 4.5 percent, and Pine Bluff, had the highest, 9.5 percent. The unemployment rates for the Little Rock-North Little Rock and the Fort Smith MSAs were 7.7 and 7.9 percent, respectively.



Boundary lines of counties having an unemployment rate less than or equal to the national average of 5.5 percent.

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CONSUMER PRICES—ALL URBAN CONSUMERS

In June, the consumer price index for all urban consumers rose 0.2 percent, seasonally adjusted and not seasonally adjusted. The index was 5.2 percent above its year-earlier level.

SEE NOTE ON TABLE BELOW
SOURCE: DEPARTMENT OF LABOR

COUNCIL OF ECONOMIC ADVISERS

[1982-84 = 100, except as noted; monthly data seasonally adjusted, except as noted]

Period	All items [1]		Food	Housing					Fuel and other utilities	Apparel and upkeep	Transportation			Medical care	Energy [2]	All items less food, shelter, and energy
				Total [1]	Shelter						Total [1]	New cars	Motor fuel			
	Not seasonally adjusted (NSA)	Seasonally adjusted			Total	Renters' costs (Dec. 1982 = 100)	Homeowners' costs (Dec. 1982 = 100)	Maintenance and repairs (NSA)								
Rel. imp. [3]	100.0	.....	16.2	42.3	27.8	7.9	19.7	0.2	7.6	6.4	17.2	4.3	3.1	6.0	7.3	48.7
1980	82.4	.....	86.8	81.1	81.0	.....	.....	82.4	75.4	90.9	83.1	88.4	37.4	74.9	86.0	80.6
1981	90.9	.....	93.6	90.4	90.5	.....	.....	90.7	86.4	95.3	93.2	93.7	108.5	82.9	97.7	88.3
1982	96.5	.....	97.4	96.9	96.9	.....	.....	96.4	94.9	97.8	97.0	97.4	92.8	92.5	99.2	95.1
1983	99.6	.....	99.4	99.5	99.1	103.0	102.5	99.9	100.2	100.2	99.3	99.9	99.4	100.6	99.9	100.0
1984	103.9	.....	103.2	103.6	104.0	108.6	107.3	103.7	104.8	102.1	103.7	102.8	97.9	106.8	100.9	105.0
1985	107.6	.....	105.6	107.7	109.8	115.4	113.1	106.5	106.5	105.0	106.4	106.1	98.7	113.5	101.6	109.0
1986	109.6	.....	109.0	110.9	115.8	121.9	119.4	107.9	104.1	105.9	102.3	110.6	77.1	122.0	88.2	112.7
1987	113.6	.....	113.5	114.2	121.3	128.1	124.8	111.8	103.0	110.6	105.4	114.6	80.2	130.1	88.6	117.0
1988	118.3	.....	118.2	118.5	127.1	133.6	131.1	114.7	104.4	115.4	108.7	116.9	80.9	138.6	89.3	121.9
1988:																
June	118.0	118.1	117.8	118.2	126.7	133.0	130.8	114.7	103.9	115.9	108.4	116.6	80.9	138.4	88.7	121.8
July	118.5	118.6	118.9	118.5	127.0	133.4	131.2	114.5	104.0	115.7	108.7	116.7	81.3	139.4	88.9	122.2
Aug	119.0	119.0	119.5	118.9	127.6	133.8	131.9	115.0	104.0	113.9	109.6	117.0	82.8	140.0	89.5	122.4
Sept	119.8	119.5	120.3	119.3	128.1	133.8	132.5	115.3	104.4	116.0	109.7	117.7	82.0	140.7	89.3	123.0
Oct	120.2	120.0	120.6	119.6	128.3	134.1	132.7	115.0	105.1	117.4	110.1	117.8	81.3	141.6	89.2	123.8
Nov	120.3	120.3	120.8	120.1	128.9	134.2	133.5	115.4	105.5	117.4	110.4	117.9	81.1	142.2	89.5	124.2
Dec	120.5	120.7	121.2	120.6	129.4	134.9	133.9	115.8	106.3	117.7	110.4	118.1	79.7	142.9	89.2	124.6
1989:																
Jan	121.1	121.4	122.1	120.9	129.7	135.2	134.2	116.1	106.9	117.7	111.2	118.9	80.5	144.0	89.9	125.4
Feb	121.6	121.9	122.6	121.3	130.3	136.4	134.7	117.1	106.7	117.5	111.9	119.3	81.8	145.2	90.4	125.8
Mar	122.3	122.5	123.6	121.7	131.1	138.2	135.1	117.1	106.9	119.1	112.6	119.7	83.6	145.9	91.4	126.3
Apr	123.1	123.3	124.2	121.8	131.2	137.3	135.6	117.3	107.4	119.4	115.0	119.8	93.0	146.6	96.1	126.6
May	123.8	124.0	125.0	122.3	131.8	137.3	136.5	117.4	107.6	120.4	116.1	119.6	96.6	147.6	97.6	127.2
June	124.1	124.2	125.3	122.6	132.3	138.1	136.9	118.3	107.1	119.1	115.9	119.3	95.4	148.7	96.6	127.4

[1] Includes items not shown separately.
[2] Household fuels—gas (piped), electricity, fuel oil, etc.—and motor fuel. Motor oil, coolant, etc. also included through 1982.
[3] Relative importance, December 1988.

NOTE.—Data beginning 1983 incorporate a rental equivalence measure for homeownership costs and therefore are not strictly comparable with figures for earlier periods.
Data beginning 1987 and 1988 calculated on a revised basis.

Source: Department of Labor, Bureau of Labor Statistics.

Arkansas Per Capita Personal Income and Population in the 1980's

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The Bureau of Economic Analysis, U.S. Department of Commerce recently published 1987 population and Per Capita Income data for the states, metropolitan statistical areas (MSA's), and counties. These data make it possible to determine how the Arkansas economy is performing relative to the rest of the U.S. economy, and to make intrastate comparisons. In this paper the data are used not only to compare the state to the nation but also to more closely examine how the economies of the various counties of the state are performing relative to one another. In Part I of this paper the behavior of real Per Capita Income (Table 1) is reviewed for the 1980-87 period; in Part II population changes (Table 2) are examined; and the relationship between the two (Table 3) is the subject of Part III. In Part IV, a method of ranking the economies of the 75 Arkansas counties is developed.

Part I
Per Capita Personal Income

One of the most meaningful among the various indicators of economic activity is Per Capita Income. This indicator allows the observer to make comparisons among regions without being influenced by size of population. Moreover, it is the best available general indicator of the economic well-being of the citizens in a particular city, county, state, etc. The following is a report on the growth of Per Capita Income in Arkansas between 1980 and 1987. In order to remove the effects of inflation, income data have been reduced to dollars of constant (1982) purchasing power. [NOTE: Table 4 income presents the data in their 'undeflated,' or current dollar, form.]

In 1960, Arkansas Per Capita Income was 62% of the national average and, as such, 49th among the 50 states. The state level has continued to rank at or near the bottom; but, more significantly, it has gained relative to the nation as a whole. By 1970, Arkansas Per Capita Income had improved to 70% of the national average and, by 1978, was 78% of the national average and 48th among the states. In 1980, Arkansas Per Capita Income was 49th among the 50 states and equal to 75% of the national average. Since 1980, Arkansas Per Capital Income has continued to grow, but has remained fairly constant relative to the U.S. average.

In 1980, the average Per Capita Income in Arkansas was $8,711 (measured in constant 1982 dollars). By 1987 the Arkansas figure grew to $9,803 which meant a slight decline to 74.5% of the national average, but an improvement in rank among the states to 46th. During this period, the average annual real growth rate was 1.8% for Arkansas while the national rate was

2.0%. Among the state's 75 counties wide divergences are noted in both dollar levels and real rates of growth.

Table 1 presents 1980 and 1987 Per Capita Income data (measured in constant 1982 dollars) for the U.S., the State of Arkansas, the 75 counties, and the 6 Metropolitan Statistical Areas. Each of the counties is listed according its their 1987 Per Capita Income ranking among the 75 counties. Figure 1 shows the counties grouped according to Per Capita Income as a percent of the U.S. average. The data show that only 15 of the 75 counties had Per Capita Income equal to, or greater than, 75% of the national average; 16 had less than 60% of the national average. Pulaski County had the highest Per Capita Income in the state--$12,583 (95.6% of the U.S.). Lee County had the lowest: $5,647 (42.9% of the U.S).

During the 1980-1987 period real average annual growth rates ranged from Carroll County (3.9%) to Hot Spring County (-0.4%). Other counties with above-average real growth rates are Montgomery (3.8%), Scott (3.4%), Washington (3.2%), Howard (3.2%), and Hempstead (3.0%). In contrast, 17 counties had real Per Capita Income growth rates of less than 1% per year, and two counties--Prairie and Hot Spring--experienced negative growth rates of -0.3% and -0.4%, respectively.

A comparison of county rankings in 1987 with those of 1980 reveals some significant changes. Howard and Washington Counties, respectively, moved to 8th and 9th in the "top ten" in 1987, after being 19th and 21st in 1980. Carroll County moved from 30th in 1980 to 12th in 1987. Scott, Hempstead, Madison, and Polk moved past 19 counties during the period. At the other end of the spectrum, Hot Spring County fell 34 places, from 22nd in 1980 to 56th in 1987; and Prairie County fell 29 places from 34th to 63rd. The counties with the highest (Pulaski) and lowest (Lee) rankings in 1980 held the same positions in 1987.

Part II
Population

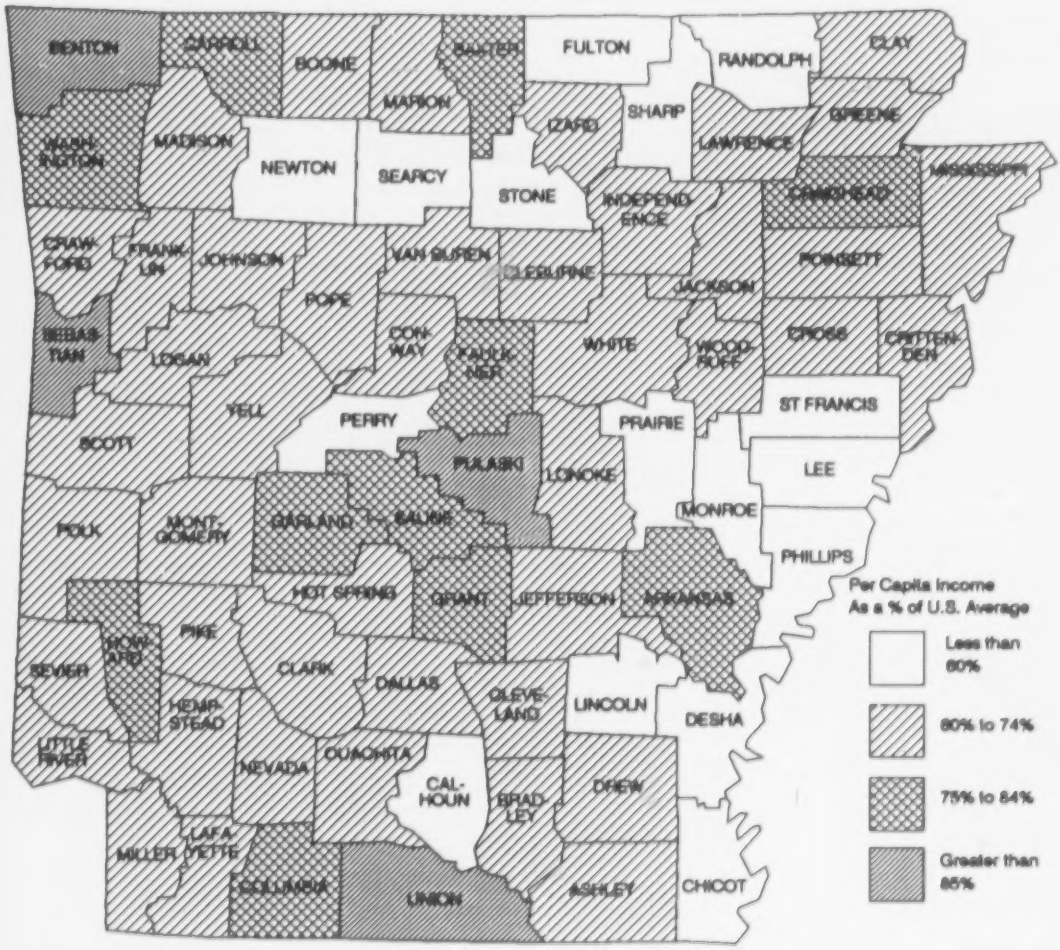
Table 2 presents population data for the State, Metropolitan Statistical Areas, and the 75 counties for 1980 and 1987. Each county is listed according to population ranking in 1987. Arkansas' population increased by 98.1 thousand (4.3%) between 1980 and 1987. As was the case with Per Capita Income, wide divergences were noted among the population growth rates of the counties. Forty-four counties gained population; 4 counties maintained a constant population; and 27 counties lost population.

The state's population gains tended to be concentrated in the counties that were the most populous in 1980. Pulaski, Washington, Benton, and Sebastian Counties--among the top five in both 1980 and 1987--grew by a total of 49.4 thousand, or about 50% of the total state net growth. The other member of the top 5, Jefferson County, lost population, as did Mississippi County, the ninth most populous. The 27 counties with negative population growth lost a total of 20.3 thousand people.

The data show that population changes brought about by migration tend to come at a slower rate than changes in income. Most counties had about the same population rankings in 1987 as they had in 1980 while Per Capita Income rankings changed significantly.

Figure 1

Arkansas' County Per Capita Income as a Percent of the U.S. Average



Source: Prepared by the Bureau of Business and Economic Research from data presented in Table 1.

Table 1

Arkansas Per Capita Income Data
1980 and 1987
In Constant (1982) Dollars

	Rank		Per Capita Income		1980-87		Avg. Annual % Change 1980-87	1987 Per Capita Income as a % of U.S. Avg.
	1987	1980	1980	1987	Change	% Change		
United States			11,574	13,155	1,581	13.7	2.0	100.0
State of Arkansas			8,711	9,803	1,092	12.5	1.8	74.5
MSA's								
Fayetteville-Springdale	4	6	8,431	10,323	1,892	22.4	3.2	78.5
Fort Smith, AR-OK	5	4	9,047	9,878	831	9.2	1.3	75.1
Little-North LR	2	1	10,634	11,866	1,232	11.6	1.7	90.2
Memphis, TN-AR-MS	1	2	10,609	12,125	1,516	14.3	2.0	92.2
Pine Bluff	6	5	8,802	9,242	441	5.0	0.7	70.3
Texarkana, AR-TX	3	3	9,576	10,500	923	9.6	1.4	79.8
Arkansas Counties								
Pulaski	1	1	11,092	12,583	1,491	13.4	1.9	95.6
Benton	2	7	9,516	11,426	1,910	20.1	2.9	86.9
Sebastian	3	2	10,161	11,376	1,215	12.0	1.7	86.5
Union	4	3	10,152	11,226	1,074	10.6	1.5	85.3
Garland	5	4	9,918	10,858	940	9.5	1.4	82.5
Baxter	6	9	9,215	10,833	1,619	17.6	2.5	82.3
Faulkner	7	10	9,118	10,556	1,439	15.8	2.3	80.2
Howard	8	19	8,522	10,412	1,890	22.2	3.2	79.1
Washington	9	21	8,431	10,323	1,892	22.4	3.2	78.5
Saline	10	5	9,817	10,282	465	4.7	0.7	78.2
Craighead	11	14	8,721	10,228	1,507	17.3	2.5	77.7
Carroll	12	30	7,981	10,178	2,197	27.5	3.9	77.4
Arkansas	13	6	9,816	10,016	201	2.0	0.3	76.1
Columbia	14	12	8,833	9,902	1,069	12.1	1.7	75.3
Grant	15	11	9,058	9,872	813	9.0	1.3	75.0
Ashley	16	17	8,578	9,740	1,162	13.6	1.9	74.0
Lafayette	17	25	8,267	9,737	1,469	17.8	2.5	74.0
Boone	18	15	8,704	9,720	1,016	11.7	1.7	73.9
Miller	19	16	8,671	9,674	1,003	11.6	1.7	73.5
Lonoke	20	8	9,397	9,546	150	1.6	0.2	72.6
Conway	21	24	8,279	9,530	1,251	15.1	2.2	72.4
Pope	22	27	8,163	9,396	1,233	15.1	2.2	71.4
Jefferson	23	13	8,802	9,242	441	5.0	0.7	70.3
Izard	24	37	7,870	9,185	1,315	16.7	2.4	69.8
Sevier	25	26	8,240	9,134	894	10.8	1.5	69.4
Little River	26	33	7,932	9,104	1,171	14.8	2.1	69.2
Independence	27	28	8,163	9,048	885	10.8	1.5	68.8
Yell	28	46	7,629	9,024	1,395	18.3	2.6	68.6
Bradley	29	29	8,012	8,939	927	11.6	1.7	67.9
Clark	30	18	8,534	8,910	376	4.4	0.6	67.7
Logan	31	39	7,747	8,856	1,110	14.3	2.0	67.3
Franklin	32	47	7,560	8,849	1,289	17.0	2.4	67.3

Table 1 (Cont.)

	Rank		Per Capita Income		1980-87		Avg. Annual % Change	1987 Per Capita Income as a % of
	1987	1980	1980	1987	Change	% Change	1980-87	U.S. Avg.
Madison	33	52	7,287	8,809	1,522	20.9	3.0	67.0
Dallas	34	23	8,286	8,806	520	6.3	0.9	66.9
Polk	35	54	7,280	8,793	1,513	20.8	3.0	66.8
Pike	36	45	7,667	8,760	1,092	14.2	2.0	66.6
Cleveland	37	36	7,872	8,758	886	11.3	1.6	66.6
Cleburne	38	41	7,694	8,747	1,053	13.7	2.0	66.5
Hempstead	39	58	7,205	8,738	1,533	21.3	3.0	66.4
Nevada	40	48	7,558	8,713	1,155	15.3	2.2	66.2
Ouachita	41	20	8,435	8,629	193	2.3	0.3	65.6
Scott	42	61	6,942	8,605	1,663	24.0	3.4	65.4
Lawrence	43	31	7,961	8,594	632	7.9	1.1	65.3
Poinsett	44	40	7,732	8,558	827	10.7	1.5	65.1
Clay	45	56	7,261	8,557	1,296	17.8	2.5	65.0
Drew	46	32	7,939	8,551	611	7.7	1.1	65.0
Mississippi	47	50	7,403	8,511	1,109	15.0	2.1	64.7
Crawford	48	44	7,676	8,455	780	10.2	1.5	64.3
White	49	55	7,272	8,450	1,178	16.2	2.3	64.2
Montgomery	50	67	6,666	8,444	1,778	26.7	3.8	64.2
Greene	51	43	7,688	8,436	747	9.7	1.4	64.1
Jackson	52	38	7,775	8,356	581	7.5	1.1	63.5
Marion	53	57	7,250	8,324	1,074	14.8	2.1	63.3
Crittenden	54	35	7,884	8,315	431	5.5	0.8	63.2
Johnson	55	49	7,417	8,301	884	11.9	1.7	63.1
Hot Spring	56	22	8,387	8,174	-213	-2.5	-0.4	62.1
Woodruff	57	59	7,023	8,125	1,102	15.7	2.2	61.8
Cross	58	42	7,692	7,970	278	3.6	0.5	60.6
Van Buren	59	68	6,656	7,910	1,254	18.8	2.7	60.1
Perry	60	66	6,722	7,851	1,129	16.8	2.4	59.7
Randolph	61	64	6,816	7,808	992	14.6	2.1	59.4
Desha	62	51	7,396	7,756	361	4.9	0.7	59.0
Prairie	63	34	7,887	7,749	-137	-1.7	-0.2	58.9
Calhoun	64	63	6,830	7,623	793	11.6	1.7	57.9
Sharp	65	53	7,282	7,556	273	3.8	0.5	57.4
Monroe	66	62	6,897	7,357	460	6.7	1.0	55.9
St. Francis	67	60	7,013	7,104	91	1.3	0.2	54.0
Fulton	68	69	6,592	7,078	487	7.4	1.1	53.8
Phillips	69	65	6,757	6,956	199	2.9	0.4	52.9
Searcy	70	70	6,114	6,923	808	13.2	1.9	52.6
Newton	71	73	5,895	6,785	890	15.1	2.2	51.6
Stone	72	74	5,789	6,734	945	16.3	2.3	51.2
Lincoln	73	72	6,064	6,597	533	8.8	1.3	50.1
Chicot	74	71	6,099	6,586	487	8.0	1.1	50.1
Lee	75	75	5,524	5,647	123	2.2	0.3	42.9

Source: Regional Economic Information System, Bureau of Economic Analysis, U.S. Department of Commerce, Washington, D.C., April 1989.

Table 2

Arkansas Population Data
1980 And 1987

	Population Rank		Population (thousands)		1980-87 Population Change	1980-87 Population
	1987	1980	1980	1987	(thousands)	% Change
State of Arkansas			2,290.1	2,388.2	98.1	4.3
MSA's						
Fayetteville-Springdale	5	5	100.6	109.7	9.1	9.0
Fort Smith, AR-OK	3	3	163.3	178.2	14.9	9.1
Little-North LR	2	2	475.5	511.5	36.0	7.6
Memphis, TN-AR-MS	1	1	915.9	971.9	56.0	6.1
Pine Bluff	6	6	90.8	90.5	-0.3	-0.3
Texarkana, AR-TX	4	4	113.4	120.4	7.0	6.2
Arkansas Counties						
Pulaski	1	1	341.2	358.1	16.9	5.0
Washington	2	2	100.6	109.7	9.1	9.0
Sebastian	3	3	95.4	100.2	4.8	5.0
Benton	4	5	78.5	92.3	13.8	17.6
Jefferson	5	4	90.8	90.5	-0.3	-0.3
Garland	6	6	70.6	76.5	5.9	8.4
Craighead	7	7	63.2	64.5	1.3	2.1
Saline	8	9	53.3	59.7	6.4	12.0
Mississippi	9	8	59.4	57.4	-2.0	-3.4
Faulkner	10	13	46.3	54.5	8.2	17.7
White	11	10	51.0	53.6	2.6	5.1
Crittenden	12	11	49.5	50.7	1.2	2.4
Union	13	12	48.6	48.9	0.3	0.6
Pope	14	14	39.2	44.1	4.9	12.5
Crawford	15	16	37.0	42.7	5.7	15.4
Lonoke	16	18	34.6	39.2	4.6	13.3
Miller	17	15	37.9	39.1	1.2	3.2
Ouachita	18	21	30.6	33.9	3.3	10.8
Independence	19	22	30.3	32.5	2.2	7.3
Phillips	20	17	34.7	32.2	-2.5	-7.2
Greene	21	20	30.8	31.7	0.9	2.9
St. Francis	22	19	30.9	31.2	0.3	1.0
Baxter	23	23	27.5	30.8	3.3	12.0
Boone	24	28	26.1	28.5	2.4	9.2
Hot Spring	25	25	26.8	27.6	0.8	3.0
Columbia	26	26	26.7	26.9	0.2	0.7
Ashley	27	27	26.6	26.0	-0.6	-2.3
Poinsett	28	24	27.0	25.9	-1.1	-4.1
Hempstead	29	30	23.6	22.9	-0.7	-3.0
Arkansas	30	29	24.2	22.8	-1.4	-5.8
Clark	31	31	23.3	22.2	-1.1	-4.7
Logan	32	35	20.2	20.8	0.6	3.0
Jackson	33	32	21.6	20.4	-1.2	-5.6
Cross	34	34	20.5	20.3	-0.2	-1.0
Cleburne	35	44	16.9	19.6	2.7	16.0
Clay	36	33	20.6	19.4	-1.2	-5.8

Table 2 (Cont.)

	Population Rank		Population (thousands)		1980-87 Population Change	1980-87 Population
	1987	1980	1980	1987	(thousands)	% Change
Desha	37	36	19.8	19.1	-0.7	-3.5
Conway	38	37	19.5	19.1	-0.4	-2.1
Johnson	39	41	17.5	18.6	1.1	6.3
Carroll	40	46	16.2	18.3	2.1	13.0
Lawrence	41	38	18.5	18.1	-0.4	-2.2
Drew	42	39	17.9	17.9	0.0	0.0
Yell	43	42	17.1	17.9	0.8	4.7
Polk	44	43	17.1	17.0	-0.1	-0.6
Chicot	45	40	17.8	16.9	-0.9	-5.1
Randolph	46	45	16.8	16.8	0.0	0.0
Sharp	47	49	14.7	15.7	1.0	6.8
Franklin	48	48	14.7	15.6	0.9	6.1
Van Buren	49	56	13.4	15.3	1.9	14.2
Lee	50	47	15.6	14.9	-0.7	-4.5
Sevier	51	50	14.1	14.2	0.1	0.7
Little River	52	51	14.0	14.1	0.1	0.7
Grant	53	57	13.0	13.7	0.7	5.4
Howard	54	54	13.5	13.4	-0.1	-0.7
Lincoln	55	55	13.4	13.1	-0.3	-2.2
Bradley	56	53	13.8	12.9	-0.9	-6.5
Monroe	57	52	14.0	12.8	-1.2	-8.6
Marion	58	58	11.4	12.8	1.4	12.3
Madison	59	59	11.4	12.1	0.7	6.1
Izard	60	62	10.8	11.1	0.3	2.8
Nevada	61	61	11.1	10.8	-0.3	-2.7
Scott	62	68	9.7	10.6	0.9	9.3
Dallas	63	63	10.5	10.4	-0.1	-1.0
Fulton	64	67	10.0	10.3	0.3	3.0
Stone	65	69	9.1	10.3	1.2	13.2
Woodruff	66	60	11.2	10.2	-1.0	-8.9
Pike	67	64	10.4	10.2	-0.2	-1.9
Prairie	68	66	10.1	10.0	-0.1	-1.0
Lafayette	69	65	10.2	9.6	-0.6	-5.9
Searcy	70	70	8.8	8.8	0.0	0.0
Cleveland	71	71	7.9	8.3	0.4	5.1
Newton	72	72	7.8	8.2	0.4	5.1
Perry	73	74	7.3	8.0	0.7	9.6
Montgomery	74	73	7.7	7.9	0.2	2.6
Calhoun	75	75	6.1	6.1	0.0	0.0

Source: Regional Economic Information System, Bureau of Economic Analysis, U.S. Department of Commerce, Washington, D.C., April 1989.

Part III
The Relationship Between Population and Per Capita Income

The data on Arkansas population and Per Capita Income tend to be consistent with economic theory. Population will tend to migrate toward areas where economic opportunity is the greatest. Areas with low income producing capacity (as measured by Per Capita Income) will lose population to areas with higher income producing capacities. The large scale migration of the 1930's and 1940's from the "Dust Bowl" region to California is a dramatic example of this process. The outmigration of young, college-educated Arkansans to Dallas, Houston, etc., is another example, but in a slower and more persistent form. The results of this process appear in the Arkansas data. The fifteen Arkansas counties that have Per Capita Income equal to or greater than 75% of the national average contain 45.6% of the state's population and account for 52.8% the state's Total Personal Income.

Generally, those counties with above average Per Capita Income also experienced above average population gains (measured in either absolute or relative terms). Pulaski County had the highest Per Capita Income in 1987; its population grew by 16.9 thousand between 1980 and 1987. The Little Rock-North Little Rock MSA (Faulkner, Lonoke, Pulaski and Saline Counties) had Per Capita Income equal to 90% of the national average; its population grew by 36 thousand. Similar parallel growth relationships are observed for Benton, Washington, Baxter, Carroll, and Pope Counties.

At the other extreme, it is observed that counties with declining population had low levels of Per Capita Income; they also had low rates of growth of Per Capita Income. Counties fitting this description include Woodruff, Lincoln, Desha, Chicot, Phillips, and Lee.

There are other counties that do not neatly fit into these two extreme categories. For example, in 1987 Arkansas County had the 13th highest level of Per Capita Income in the state, yet its population declined by 1.4 thousand (5.8%) between 1980 and 1987. However, its population decline, while inconsistent with its high level of Per Capita Income, is consistent with its low rate of increase of Per Capita Income (0.3% per year since 1980).

Part IV
An Imperfect Scheme for Rating the Economies of the 75 Arkansas Counties

An examination of the data indicates that the "vitality" of each county's economy is evidenced by the levels and the rates of change of its Per Capita Income and population. A crude "index of relative economic vitality" was constructed by ranking the 75 counties in each of the following categories:

1. 1987 Per Capita Income
2. Absolute Change of Per Capita Income - 1980-87
3. Rate of Change of Per Capita Income - 1980-87
4. 1987 Population
5. Absolute Change of Population - 1980-87
6. Rate of Change of Population - 1980-87

The sum of each county's ranks in these six categories yields the "index". If a county ranked first in every category (which none did) it would have the "perfect" index number of six. Table 3 presents the rankings of the 75 Arkansas counties as calculated by this method. Benton County achieved the top ranking with an index of 21 by ranking 2nd in four categories, plus a 4th and 9th place in two categories. Lee County ranked 75th among the counties with an index of 395.

The rankings of many counties are significantly different than those based solely on Per Capita Income. For example, Arkansas County, cited above, ranked 13th in Per Capita Income, but ranked 66th according to its index because of its low (or negative) growth performance between 1980 and 1987. Carroll County is an example at the other extreme. In 1987 it ranked 40th in population and 12th in Per Capita Income, but ranked 4th on the index because of its high growth performance.

Part V
Summary and Conclusions

The purpose of this paper was to present the latest population and Per Capita Income data for Arkansas and to provide some framework for analysis of the data. A preliminary, and some- what crude, method for evaluating the counties--the index of relative economic vitality--was developed. More work needs to be done, but it is a beginning. Moreover, this paper has dealt only with the results of underlying forces; it provides no analysis of why some counties do well and others do poorly. Still, the data suggest the following: The State of Arkansas, while a single political entity, consists of several diverse "economies." To speak of Arkansas as a "poor" state is to oversimplify. Some parts of the state are doing quite well economically; other parts are lagging far behind. Central Arkansas and Northwest Arkansas are examples of the former while Eastern Arkansas is an example of the latter.

Table 3

Rankings Of Arkansas Counties By Index of Relative Economic Vitality

		Rank by Category						
			1980-87 Population		1987	1980-87 Per Capita Income		Index
Rank	Arkansas Counties	1987 Population	Change	% Change	Per Capita Income	Change	% Change	(Sum of Rankings)
1	Benton	4	2	2	2	2	9	21
2	Washington	2	3	17	9	3	4	38
3	Faulkner	10	4	1	7	14	21	57
4	Baxter	23	11	12	6	7	14	73
5	Carroll	40	17	8	12	1	1	79
6	Pulaski	1	1	29	1	12	35	79
7	Pope	14	8	9	22	21	25	99
8	Sebastian	3	9	28	3	22	38	103
9	Craighead	7	20	39	11	11	15	103
10	Garland	6	6	18	5	40	51	126
11	White	11	14	26	49	23	20	143
12	Boone	24	15	16	18	36	40	149
13	Scott	62	27	15	42	6	3	155
14	Cleburne	35	13	3	38	35	33	157
15	Yell	43	30	30	28	15	11	157
16	Saline	8	5	11	10	60	64	158
17	Van Buren	49	18	5	59	19	10	160
18	Madison	59	32	22	33	9	7	162
19	Franklin	48	26	23	32	18	16	163
20	Miller	17	22	31	19	37	43	169
21	Howard	54	49	51	8	4	5	171
22	Independence	19	16	19	27	45	46	172
23	Crawford	15	7	4	48	51	49	174
24	Union	13	40	44	4	32	48	181
25	Logan	32	34	34	31	28	31	190
26	Izard	60	39	36	24	16	18	193
27	Columbia	26	42	41	14	34	37	194
28	Lonoke	16	10	6	20	71	72	195
29	Polk	44	52	50	35	10	8	199
30	Marion	58	19	10	53	33	28	201
31	Hempstead	29	64	61	39	8	6	207
32	Montgomery	74	41	37	50	5	2	209
33	Little River	52	43	42	26	24	29	216
34	Conway	38	59	56	21	20	24	218
35	Perry	73	31	14	60	27	17	222
36	Ashley	27	61	59	16	25	34	222
37	Ouachita	18	12	13	41	70	69	223
38	Johnson	39	24	21	55	46	39	224
39	Stone	65	23	7	72	39	19	225
40	Grant	53	33	24	15	48	52	225
41	Greene	21	28	35	51	52	50	237
42	Lafayette	69	60	71	17	13	13	243
43	Mississippi	9	74	62	47	29	27	248
44	Crittenden	12	21	38	54	63	61	249
45	Sevier	51	44	43	25	42	45	250

Table 3 (Cont.)

Rank	Arkansas Counties	Rank by Category: 1987 Population	1980-87 Population Change	1980-87 Population % Change	1987 Per Capita Income	1980-87 Per Capita Income Change	1980-87 Per Capita Income % Change	Index (Sum of Rankings)
46	Clay	36	71	70	45	17	12	251
47	Jefferson	5	55	49	23	62	62	256
48	Cleveland	71	35	27	37	44	44	258
49	Nevada	61	56	60	40	26	23	266
50	Randolph	46	47	45	61	38	30	267
51	Newton	72	36	25	71	43	26	273
52	Pike	67	54	55	36	31	32	275
53	Drew	42	46	46	46	54	56	290
54	Sharp	47	25	20	65	67	66	290
55	Hot Spring	25	29	33	56	75	75	293
56	Poinsett	28	69	64	44	47	47	299
57	Bradley	56	65	72	29	41	42	305
58	Lawrence	41	58	57	43	53	55	307
59	St. Francis	22	37	40	67	73	73	312
60	Dallas	63	50	52	34	57	60	316
61	Woodruff	66	67	75	57	30	22	317
62	Fulton	64	38	32	68	59	58	319
63	Searcy	70	48	48	70	49	36	321
64	Calhoun	75	45	47	64	50	41	322
65	Clark	31	68	66	30	64	65	324
66	Arkansas	30	73	69	13	68	71	324
67	Cross	34	53	53	58	66	67	331
68	Jackson	33	72	68	52	55	57	337
69	Lincoln	55	57	58	73	56	53	352
70	Desha	37	62	63	62	65	63	352
71	Chicot	45	66	67	74	58	54	364
72	Phillips	20	75	73	69	69	68	374
73	Prairie	68	51	54	63	74	74	384
74	Monroe	57	70	74	66	61	59	387
75	Lee	50	63	65	75	72	70	395

Source: Bureau of Business and Economic Research derived from data in Table 1 and Table 2.

Table 4

Arkansas Per Capita Income Data
1980 and 1987
(Current Dollars)

	Rank		Per Capita Income		1980-87		1980-87 Avg. Annual
	1980	1987	1980	1987	Change	% Change	% Change
United States			9,919	15,484	5,565	56.1	8.0
State of Arkansas			7,465	11,538	4,073	54.6	7.8
MSA's							
Fayetteville-Springdale	4	6	7,225	12,150	4,925	68.2	9.7
Fort Smith, AR-OK	5	4	7,753	11,626	3,873	50.0	7.1
Little-North LR	2	1	9,113	13,966	4,853	53.3	7.6
Memphis, TN-AR-MS	1	2	9,092	14,271	5,179	57.0	8.1
Pine Bluff	6	5	7,543	10,878	3,335	44.2	6.3
Texarkana, AR-TX	3	3	8,207	12,358	4,151	50.6	7.2
Arkansas Counties							
Arkansas	13	6	8,412	11,789	3,377	40.1	5.7
Ashley	16	17	7,351	11,464	4,113	56.0	8.0
Baxter	6	9	7,897	12,751	4,854	61.5	8.8
Benton	2	7	8,155	13,448	5,293	64.9	9.3
Boone	18	15	7,459	11,440	3,981	53.4	7.6
Bradley	29	29	6,866	10,521	3,655	53.2	7.6
Calhoun	64	63	5,853	8,972	3,119	53.3	7.6
Carroll	12	30	6,840	11,980	5,140	75.1	10.7
Chicot	74	71	5,227	7,752	2,525	48.3	6.9
Clark	30	18	7,314	10,487	3,173	43.4	6.2
Clay	45	56	6,223	10,072	3,849	61.9	8.8
Cleburne	38	41	6,594	10,295	3,701	56.1	8.0
Cleveland	37	36	6,746	10,308	3,562	52.8	7.5
Columbia	14	12	7,570	11,655	4,085	54.0	7.7
Conway	21	24	7,095	11,217	4,122	58.1	8.3
Craighead	11	14	7,474	12,038	4,564	61.1	8.7
Crawford	48	44	6,578	9,952	3,374	51.3	7.3
Crittenden	54	35	6,757	9,787	3,030	44.8	6.4
Cross	58	42	6,592	9,381	2,789	42.3	6.0
Dallas	34	23	7,101	10,365	3,264	46.0	6.6
Desha	62	51	6,338	9,129	2,791	44.0	6.3
Drew	46	32	6,804	10,064	3,260	47.9	6.8
Faulkner	7	10	7,814	12,425	4,611	59.0	8.4
Franklin	32	47	6,479	10,415	3,936	60.8	8.7
Fulton	68	69	5,649	8,331	2,682	47.5	6.8
Garland	5	4	8,500	12,780	4,280	50.4	7.2
Grant	15	11	7,763	11,619	3,856	49.7	7.1
Greene	51	43	6,589	9,929	3,340	50.7	7.2
Hempstead	39	58	6,175	10,285	4,110	66.6	9.5
Hot Spring	56	22	7,188	9,621	2,433	33.8	4.8
Howard	8	19	7,303	12,255	4,952	67.8	9.7
Independence	27	28	6,996	10,650	3,654	52.2	7.5
Izard	24	37	6,745	10,811	4,066	60.3	8.6
Jackson	52	38	6,663	9,835	3,172	47.6	6.8

Table 4 (Cont.)

	Rank		Per Capita Income		1980-87		1980-87 Avg. Annual
	1980	1987	1980	1987	Change	% Change	% Change
Jefferson	23	13	7,543	10,878	3,335	44.2	6.3
Johnson	55	49	6,356	9,770	3,414	53.7	7.7
Lafayette	17	25	7,085	11,460	4,375	61.8	8.8
Lawrence	43	31	6,823	10,115	3,292	48.2	6.9
Lee	75	75	4,734	6,646	1,912	40.4	5.8
Lincoln	73	72	5,197	7,765	2,568	49.4	7.1
Little River	26	33	6,798	10,715	3,917	57.6	8.2
Logan	31	39	6,639	10,424	3,785	57.0	8.1
Lonoke	20	8	8,053	11,236	3,183	39.5	5.6
Madison	33	52	6,245	10,368	4,123	66.0	9.4
Marion	53	57	6,213	9,797	3,584	57.7	8.2
Miller	19	16	7,431	11,386	3,955	53.2	7.6
Mississippi	47	50	6,344	10,018	3,674	57.9	8.3
Monroe	66	62	5,911	8,659	2,748	46.5	6.6
Montgomery	50	67	5,713	9,939	4,226	74.0	10.6
Nevada	40	48	6,477	10,255	3,778	58.3	8.3
Newton	71	73	5,052	7,986	2,934	58.1	8.3
Ouachita	41	20	7,229	10,156	2,927	40.5	5.8
Perry	60	66	5,761	9,241	3,480	60.4	8.6
Phillips	69	65	5,791	8,187	2,396	41.4	5.9
Pike	36	45	6,571	10,310	3,739	56.9	8.1
Poinsett	44	40	6,626	10,073	3,447	52.0	7.4
Polk	35	54	6,239	10,349	4,110	65.9	9.4
Pope	22	27	6,996	11,059	4,063	58.1	8.3
Prairie	63	34	6,759	9,121	2,362	34.9	5.0
Pulaski	1	1	9,506	14,810	5,304	55.8	8.0
Randolph	61	64	5,841	9,190	3,349	57.3	8.2
St. Francis	67	60	6,010	8,361	2,351	39.1	5.6
Saline	10	5	8,413	12,102	3,689	43.8	6.3
Scott	42	61	5,949	10,128	4,179	70.2	10.0
Searcy	70	70	5,240	8,148	2,908	55.5	7.9
Sebastian	3	2	8,708	13,390	4,682	53.8	7.7
Sevier	25	26	7,062	10,751	3,689	52.2	7.5
Sharp	65	53	6,241	8,893	2,652	42.5	6.1
Stone	72	74	4,961	7,926	2,965	59.8	8.5
Union	4	3	8,700	13,213	4,513	51.9	7.4
Van Buren	59	68	5,704	9,310	3,606	63.2	9.0
Washington	9	21	7,225	12,150	4,925	68.2	9.7
White	49	55	6,232	9,946	3,714	59.6	8.5
Woodruff	57	59	6,019	9,563	3,544	58.9	8.4
Yell	28	46	6,538	10,621	4,083	62.5	8.9

Source: Regional Economic Information System, Bureau of Economic Analysis, U.S. Department of Commerce, Washington, D.C., April 1989.

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